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No. 2.

Annual Meeting of the Lake Carriers.

Members of the Lake Carriers' Association who will assemble at the Hotel Cadillac, Detroit, on Wednesday next, will very probably elect Capt. James Dunham of Chicago to the presidency for the coming year. An attempt will be made to secure an agreement on some method of regulating lake freights, but there is little hope of much being accomplished in this regard, although Aaron Parker of Detroit, who has had the matter in hand, has the confidence of vessel owners all over the lakes, and any scheme that may be presented will be given careful consideration. It may be that a plan of minimum rates on coal can be agreed to, but most owners have little hope of the success of any attempt to deal with ore freights, on account of the allied interests of ore on vessel companies. The shoveling of grain at Buffalo, which now involves an expenditure for labor and management of nearly \$700,000 annually, will probably be a disturbing element in affairs of the association again this year, as there are a number of vessel owners who are insisting upon a reduction of these charges on the claim that the margin of profit in the management of the business is too large. All sorts of claims are made about profits in the contract, but none of them are of a definite kind. The meeting will undoubtedly be very largely attended.

The official notice of the meeting from secretary Charles H. Keep of Buffalo is as follows:

"The annual meeting of the Lake Carriers' Association will be held at the Cadillac hotel, Detroit, on the 19th day of January, 1898, at 10 o'clock a. m. The annual reports for the year just closing will be presented, new officers and a new board of managers will be elected, the standing committees for the coming year will be appointed, the rate of annual dues for the year 1898 will be fixed, and other important business will be transacted. Reports will be received from the committees appointed to consider the loading and unloading charges on the various kinds of lake freight for the season of 1898, and the possibility of rendering the carrying business on the lakes more profitable in 1898 than it has been in 1897 by an agreement amongst vessel owners to establish a minimum charge for the transportation of coal and possibly also for the transportation of iron ore, will be thoroughly discussed. The Lake Carriers' Association cannot of itself take any action fixing freight rates, since it has no power to bind the action of individual vessel owners. Any action to be effective must be individual action by vessel owners and managers, supported by a very large proportion of the vessel tonnage engaged in transporting the commodities in question. The annual meeting of the Lake Carriers' Association has become the one important gathering of vessel owners from all parts of the lakes. It seems therefore to be a proper place for the discussion of all questions on which there is a possibility that united action may be advantageous to owners' interests. The meeting will continue for at least two days. On the evening of the 19th Mr. H. F. J. Porter of Bethlehem, Pa., will deliver an illustrated lecture on 'Steel Forgings.' The business sessions of the association and its committees will be so arranged as to permit members to attend this lecture. You are earnestly requested to be present in Detroit on the 19th inst., and if you cannot personally attend, you are urged to send a proxy who can represent your tonnage. You are also requested to extend a cordial invitation to all vessel owners who have not heretofore been members of the Lake Carriers' Association to attend the convention."

Requirements of the Railways.

The Railroad Gazette has just concluded a systematic inquiry regarding the requirements of railroads in the next six months. Roads owning 810,000 freight cars, or two-thirds of the freight car equipment of the country, report that they will need to order 24,000 freight cars between now and July 1. If the others order in like proportion, estimating also 2,000 cars for new lines, the car orders of the first half of 1898 will be 38,000, or within 13,000 of the number built by contracting shops in the whole year 1896, and equal to the number built by such shops in 1895. For 1897, the total was 45,588 cars, or about 60 per cent. of the indicated total for this year, presuming that present plans are carried out and that the second half of the year is as productive of work in this line as the first half. Railroads owning two-thirds of the engines of the country say that they will need 243 new locomotives in the first half of 1898. From this the Gazette assumes orders for 360, and, counting new roads, probably 400. Last year the total built for twelve months was 1,251. The estimate for the first half of the year indicates a total of 800 for the year 1898, but this takes no account of exports, which for 1897 are likely to be officially reported close to 300, possibly more. The indications are, therefore, for a heavy run of work at car shops in the coming year, and for locomotive works, if the foreign demand increases as it has done in 1897, about such a business as they have seen in the past two years.

Four hundred steel ore cars, in addition to 600 already built, will be provided for the Carnegie ore railway—Conneaut to Pittsburg—before the opening of navigation next spring. Steel rails of the hundred-pound kind are now being laid on the road, and the new twelve-rig plant for direct transfer of ore from vessels to cars at Conneaut is nearing completion. A car dumping machine for transfer of coal at Conneaut is also to be erected by the McMyler Mfg. Co. of Cleveland before the opening of navigation, and during the present week a Thew steam shovel for loading ore from dock to cars will be installed on the storage dock.

New Gunboat Recommended by Naval Officials.

Secretary Long of the navy department sends the senate committee on naval affairs a report that is decidedly in favor of the construction of a gunboat to replace the Michigan on the lakes. Senator McMillan's bill providing for the construction of this vessel was referred to the navy department by this committee of the senate, and in returning it the secretary says:

"The bureaus of construction and repair and steam engineering report concerning this matter that in their opinion it would be to the interest of the government to have the Michigan replaced by a vessel which as a representative of the navy upon the great lakes would have features of note other than antiquity. They note further that the limit of cost is that of the composite gunboats Wheeling and Marietta. This limit was inadequate for these vessels and they are of the opinion that a gunboat upon the great lakes should differ from the Wheeling type in being unsheathed and of not less than 15 knots trial speed. This would involve greater cost and they suggest \$260,000 as an appropriate limit of cost.

"The views of Lieut.-Com. Richard Rush, commanding the Michigan, were also requested, and he states that that vessel is, on account of her breadth with the houses on the sides for the paddle wheels, unable to pass through the Welland canal into Lake Ontario, and that during the open season on the lakes she is employed in the drilling of the naval militia of Ohio, Michigan and Illinois, and in surveying work, for both of which duties she is ill-adapted, because she is of such an antiquated type that very little practical instruction or drill of any value on modern vessels can be given the militia, and because she is so clumsy in the water and so inconveniently constructed as to forbid her being of as great service in this direction as the importance of the work demands. Mr. Rush adds that as said vessel not only has entirely outlived her usefulness as a warship, but is inadequately constructed to meet the present demands of the service, during peace, the time has arrived when, in his opinion, she should be replaced by a modern naval vessel.

"In view of the foregoing the department considers it important that a new vessel should be built and put on the great lakes at an early date, and as soon as the condition of the public finances will permit of the requisite expenditure, provided that congress considers that such motion would not be in violation of the agreement of 1817 between this government and Great Britain relative to the naval forces to be maintained in those waters."

Senator McMillan will be authorized to report the bill to the senate with a favorable recommendation in time to be incorporated with the annual naval appropriation bill, which is now being prepared by the house naval committee.

Names of the New Rockefeller Ships.

The management of the Bessemer Steamship Co. has decided upon names for the steel steamer and two steel tow barges building at the works of F. W. Wheeler & Co. The scheme of honoring inventors whose achievements have been of special importance to the iron industry is still further carried out in the selection of names for the three new vessels. The steamer will be named Samuel F. B. Morse and the barges John A. Roebling and John Fritz.

Samuel F. B. Morse was the inventor of the electric telegraph, without which railway development with its present magnitude would have been impossible.

John A. Roebling is distinguished as the engineer who built the Brooklyn bridge, the suspension bridge at Niagara and several other suspension bridges. He was the great pioneer in the manufacture and introduction of wire rods.

John Fritz is still living and is the most eminent mechanical engineer in this country. He built the Cambria Iron Works and later the Bethlehem Iron Works, and as the inventor of the three-roll system has probably done more than any other engineer for the introduction of the Bessemer process and appliances for cheapening and enlarging the production of iron.

When Capt. J. A. Landfair of the steamer Republic, who is one of the veterans among lake shipmasters, left Cleveland for his home in Leslie, Mich., a few weeks ago, it was with the understanding that he was to quit sailing. He retires with the best wishes of everybody who knew him as a vessel master, and it is understood that he has laid aside fun's sufficient to pass in comfort the years that are due him ashore. Officers of the Republic Iron Co., with whom Capt. Landfair had been engaged for about sixteen years, refer quite feelingly to his retirement and are of the opinion that too much cannot be said of his gentlemanly qualities, kind disposition and success as a vessel master. Capt. Landfair, who in late years was often heard to refer, in a kind of fatherly way, to the other captains of the Lake Superior and Republic lines as "the boys," was equally well liked by these men. Capt. E. T. Rattray of the steamer Joliet succeeds Capt. Landfair in command of the Republic, and Capt. Charles Hinslea, who was in the Specular last season, takes the Joliet. Promotions will be made in other boats of the Republic line in accordance with this change. The vacancy at the end of the list will be filled by giving command of the schooner Grace Holland to Capt. B. M. Landfair, a nephew of Capt. J. A. Landfair, who was mate on the Republic.

Mr. E. C. Pope, who was long known as the sales agent for Norrie ore, has terminated his connection with Pickands, Mather & Co., and is again in his old offices in the Wade building, Cleveland.

To Solve Problems in Hydraulic Engineering.

Reference has been made to the use of the hydraulic laboratory, now being built within the grounds of Cornell University, Ithaca, N. Y., for the purpose of conducting experiments with models of ships, according to methods long ago adopted by several European governments and soon to be taken up by the United States navy in the model tank now building at Washington. These experiments with ships' models will, however, be only one of the numerous uses to which the Cornell laboratory will be applied. It will be the largest and most complete hydraulic laboratory in existence. The opportunity for a hydraulic installation of this kind is afforded by the peculiar conformation of a stream that runs within the property of the university. The plant will include a dam, a canal, a waterfall, a standpipe and a laboratory building. The maximum water capacity will be 1,700 cubic feet of water per second. The canal is 450 feet long, 16 feet wide and 10 feet deep. It is estimated that but for the natural conditions afforded at Cornell, \$3,000,000 would not provide this laboratory, which is expected to solve a great many problems of the highest importance to hydraulic engineers. Speaking of the experiments that may be undertaken, Prof. A. E. Fuertes, director of the college of civil engineering, says:

"To deal effectively with water, it is necessary to be equipped with apparatus and accomplishments entirely different from any which would be required in other specialties in engineering. It has been believed that the limit reached in the progress of hydraulics is due mainly to the lack of opportunities for proper experimentation on a suitable scale. And this is all the more strange, since almost every nation on the face of the earth is obliged to spend in the aggregate fabulous sums of money in the improvement of rivers, harbors and coast defenses. Yet a large number of unsolved doubts of tentative hydraulic works are forced upon the engineer. This laboratory will enable the engineer to devise any single simple problem, and after study of its constructions, add to the original problem such disturbing new conditions as may enable him to discriminate between the effects of individual, simple causes and their combined interaction. A hasty survey of the causes of failure in many of the river improvements upon the Danube, Rhine, Rhone and our own Mississippi, reveals the necessity of better data and a settlement of the long-disputed theories of transportation by dragging and by suspension in water. That we will be able to solve some of the great problems in engineering is almost certain from the superior nature of the equipment.

"These great problems affect the whole range of engineering, and with a view to solving some of them we have mapped out the following range of experiments: Studies upon the dragging and suspending power of water at the various stages of saturation with sediment; the effect of transverse, longitudinal and submerged dams, under standard conditions, which may be modified at will by certain disturbing influences; determining the corrections to be made in the beds of streams so as to give them the most permanent longitudinal profile; studies upon the conditions of such rivers as build their minor beds above their major bed; studies of canals, bars and deltas, and of the disposition of sediment from rivers into quiescent water, and against high tides; study of the conditions affecting the tangents and curvature in water courses, looking to securing permanence of channels and depth of water; studies upon the delivery conditions of the watersheds of streams and the tributaries which feed canals, in reference to the amount and kind of matter suspended by floods, the inter-relations of the deliveries of tributary floods; also such studies as may prove useful for determining the co-efficients of flood volume, the length of dams, spillways and height of floods over them, so as to perfect the formulas for the delivery of watersheds. The watershed of the Cornell canal covers 117 square miles, which will be most perfectly surveyed, topographically and geologically.

"With this canal experiments can also be made upon current meters and the motion of water in open channels, in pipes and over weirs, under variable conditions of velocity, materials of bed, conditions of surface contractions and heads. Then there is the determination of the resistance of motion of boats in canals, the effect of waves, etc., and experiments on water-jets, forms of water-wheels, buckets, and forms of propellers, including water propulsion; which subjects by themselves will give rise to a large number of investigations.

"The uses of this laboratory will not be restrained simply to questions strictly classified as of hydraulic importance. For example, on the sanitary side, the relations that should exist between the grade of a sewer, its size, and the volume of flush water required to produce a given effect are almost entirely unknown. Many of the labors undertaken by the various boards of health can be extended and made useful much more rapidly than under the cramped conditions usually enjoyed by them. It is hoped that this laboratory may aid the boards of health in directions as yet unattainable by reason of expense and lack of facilities."

Lieut. A. H. Scales and Ensign G. C. Day, naval officers who have been assigned to hydrographic office duties on the lakes, are now with Lieut. Stafford at the Cleveland branch office acquainting themselves with details of the work. Lieut. Scales will probably go to the new branch office at the Sault and Ensign Day to Duluth.

Officers of Chicago lodge No. 3, Ship Masters' Association, for 1898 are: President, C. H. Hubbard; first vice-president, L. B. Coates; second vice-president, Fred T. Weimar; treasurer, Wm. W. Shaw; secretary, Frank B. Higgin; delegate to grand lodge, John Jenks.

Laird Brothers, the Clyde ship builders, recently launched from their yards the torpedo boat destroyer Express for the British government, the largest and fastest destroyer afloat. Her length is 235 feet, and her speed is to be 33 knots an hour, equal to nearly 38 miles.

The annual meeting of the Grand Harbor, American Association of Masters and Pilots of Steam Vessels, will open in Washington on the 17th inst., which is also the date of opening of the annual convention of the Marine Engineers' Beneficial Association in the same city.

All charts sold by the Marine Review are corrected to date of sale.

Encouraging Outlook in Iron Mining Districts.

In view of preparations that are being made for shipments from new mines, referred to further on in this article, it is evident that, without any pushing, the production of 1898 for the two Minnesota iron ranges can be made something enormous. It is now generally believed it may amount to from one and a half to two million tons more than for the season just closed. Indeed, not only are preparations by mines on such a scale as to indicate that this belief is general among mining managers, but the railroads that carry the ore to market are adding to facilities enough rolling stock, motive power, stock and dock room, tankage, main lines, etc., to handle with the greatest ease fully 2,500,000 tons more than ever before. Labor on the ranges is receiving better pay at the close of the year than for a long time, and the demand for experienced miners has been such as not only to absorb the entire floating population of the districts, but to cause the return of hundreds of men who, during the late depression, had migrated to more promising fields in the far west, the south, the new north, and in foreign countries. Stock-piles on both Minnesota ore ranges are more closely shipped than for many years, one company having got rid of ore that had been on surface for the past five seasons. It is estimated that there were on both ranges at the close of navigation not over 500,000 tons of ore in stock. Mines that did nothing in the way of winning ore during the year were enabled toward its close to make shipments of what they had held in stock, and quite generally availed themselves of the opportunity. For this reason any increase in shipments for the coming year will make and keep the mines very active for the entire season, and labor will be remuneratively employed. No strike shadow has cast itself over the Minnesota districts, and none is expected. The Miners' Union, which has endeavored to make matters unpleasant on the Marquette range in Michigan, has gained no foothold in Minnesota for several reasons, and without it there is no likelihood of labor troubles of magnitude.

There are now on the Mesabi range six of the class of mines known as "steam-shovel" properties, where the ore is first stripped of the superincumbent earth, and then mined directly by shovels into cars, without underground work of any nature, and very often without any loosening of the ore or preparation for the shovel. These six mines are all preparing for greater outputs the coming year than before, and all are stripping off more and more of the surface. Two of them are new mines, and were shippers in a very small way—one, the Sparta, shipped in 1897, while another, the Aetna, has shipped only one cargo, and that several years ago. Both are large deposits, the latter being a portion of the celebrated Mountain Iron ore body. Four of these mines, the Biwabik, Mountain Iron, Oliver and Mahoning, have already opened a great quantity of ore, either one sufficient, as far as utility goes, to supply the United States for an entire year, and probably very much longer. More steam-shovel mines may yet be found on the Mesabi, but the probability is not great. While explorations have not been active the present year, they have been sufficient to cover fairly well the ground that had not been before explored, and it is now for the first time safe to say that the Mesabi will probably see few more mines than it has already opened or explored sufficiently to prove. Of these latter explorations there are a number on the range that may become active mines in a year or two. Some of them indicate very large and important deposits of ore. Strange as it may seem, there are indications that there is a better field for the skilled explorer on the Vermilion range than on the Mesabi. The former has been cast into the shadow and somewhat neglected during the exploitation of its newer competitor, and now presents a very considerable area that offers an inviting prospect for the explorer. Many mines of high-grade hard ore are likely to be found on the Vermilion in the next few years.

Twenty-two mines shipped ore from the Mesabi the present year, and four from the Vermilion. On the Mesabi four mines were idle during all or nearly all of the year. There are no present indications that all of these idle mines will be put in operation during 1898, but most of them will probably resume soon. There are on the Mesabi range six mines—the Sparta, Genoa, Roberts, Penobscot, Commodore and part of the Lake Superior group—that have not passed out of the initial stages of development, and on all these active work is now under way in preparation for a greatly increased business the coming year. Not one of these properties can be classed as a small mine, or even as of ordinary size; all are great deposits, and each is of better than the usual richness of Mesabi ores. Their part in the output for next year is considered to be a very important one. On the Vermilion range the Zenith mine stands in the same position as do the six above referred to, and it, too, is a great deposit of unusual value. Four mines that will make their initial shipment in 1898 are now being developed on the Mesabi, the Aetna, Day, Elba and Pillsbury, while on the Vermilion there are two that are expected to become active shippers to some extent during the year. These latter are the Section 26 and Southall, as well as, perhaps, one or two properties that are not yet in so forward a stage of development as they. All of these new mines are likely to be added to the class of big ones—Duluth correspondence in Engineering & Mining Journal.

Henry R. Worthington are contemplating enlargements of their present storage capacity for castings for their standard sizes of pumps. They carry in storage from two to three months' supply of all standard castings of 6-inch stroke pumps and smaller sizes, and it is now proposed to extend this system to standard pumps of much larger sizes.

Hon. D. M. McPherson, well-known as the manager of the Halifax graving dock, retired on the first of the year. His successor has not been appointed and probably will not be for some time to come. Mr. McPherson was at one time mayor of Halifax and is now a member of parliament.

Chicago Harbor No. 33, American Association of Masters and Pilots has elected the following officers for 1898: Captain, John Jenks; first pilot, L. B. Coates; second pilot, Wm. Brown; purser, James Grion; captain's clerk and delegate to meeting of Grand Harbor, Geo. Tebo.

Commerce of Portage Lake Canals.

Although Lake Superior commerce as a whole increased about 2,000,000 tons in 1897, it is strange that the commerce of the Portage Lake canals shows a decrease of about 21,000 tons as compared with 1896. There was moved through these canals in 1897 1,020,723 net tons of freight, valued at \$34,044,268.85. In 1896 the tons of freight aggregated 1,041,933. The loss is evidently in vessels passing through the canals, as the summary of commerce shows increases in such items of freight as copper, coal and general merchandise, which represent receipts and shipments of the Portage Lake region. A summary of commercial statistics of the canals, prepared by Major Clinton B. Sears, United States engineer in charge, includes tables that divide the eastbound and westbound traffic by months. There are also separate tables showing the business of tugs, rafts, scows, etc., and the local business of Portage Lake, as well as the business of the upper canal. The entire general commerce of the canals is set forth in the following tables:

COMPARISON OF COMMERCE THROUGH PORTAGE LAKE SHIP CANALS, MICHIGAN, FOR SEASONS OF 1896 AND 1897.

Items.	Designation.	SEASONS.		Increase Amount.	Decrease Amount.
		1896	1897		
Steam	Number	3,068	2,517	551	
Sail	"	500	414	86	
Tonnage, registered	Net tons	1,076,548	1,020,723	51,173	
Passengers	Number	41,262	34,942	6,320	
Coal	Net tons	398,964	438,604	39,640	
Flour	Barrels	774,143	450,712	323,431	
Wheat	Barrels	225,430	60,000	165,430	
Grain (not wheat)	"	100,533	4,000	96,533	
Salt	Barrels	99,813	136,270	36,457	
Copper	Net tons	74,473	78,732	4,259	
Iron Ore	"	16,755	4,949	11,806	
Pig iron	"	8,032	3,330	4,702	
Manufactured iron	"	14,172	10,436	3,736	
Lumber	M. ft. B. M.	103,504	99,113	4,391	
Logs	"	39,115	26,250	12,865	
Building stone	Net tons	14,674	17,482	2,808	
Miscellaneous merchandise	"	127,447	174,624	47,182	
Total freight	"	1,041,933	1,020,723	21,210	

ESTIMATED VALUE OF FREIGHT THROUGH PORTAGE LAKE SHIP CANALS FOR THE SEASON OF 1897.

Items.	Designation.	Quantities.	Price per Unit	Valuation.
Coal	Net tons	438,604	\$3.65	\$1,600,904.60
Flour	Barrels	450,712	5.00	2,253,560.00
Wheat	Bushels	60,000	.90	54,000.00
Grain (other than wheat)	"	4,000	.50	2,000.00
Manufactured iron	Net tons	10,436	50.00	521,800.00
Pig iron	"	3,330	13.50	44,955.00
Iron ore	"	4,949	3.25	16,084.25
Salt	Barrels	136,270	.75	102,202.50
Copper	Net tons	78,732	220.00	17,321,040.00
Lumber	M. ft. B. M.	99,113	12.50	1,238,912.50
Logs	"	26,250	9.00	236,250.00
Building Stone	Net tons	17,482	10.00	174,820.00
Unclassified freight	"	174,624	60.00	10,477,740.00
Total				\$34,044,268.85

New Buffalo Dredges.

Hingston & Woods, dredging contractors of Buffalo, have furnished the Review with particulars of the two new dredges which they are to have in operation next season. The larger dredge will be 135 by 44 feet, with a forward depth of 13½ feet and a depth at the stern of 10 feet. This dredge, capable of digging in 20 feet of water, will be of the boom type and will have an 8-yard dipper which she is expected to swing in 45 seconds. Engines are double, high pressure, 18 by 24 inches, and there will be two 12-foot hoisting gears of 12 inches face. Independent engines will be provided for swinging, backing, raising anchors, and applying frictions. Her forward spuds, or anchors, will be 48 inches square and there will be two stern spuds, each 24 inches square. The boom and A-frame will be of iron. In place of chains the dredge will be fully equipped with wire ropes; these being noiseless, will be a great improvement in operating the dredge, and will be more direct in their action. The hull will be trussed and secured in a most substantial manner, lighted by electricity, and generally complete in finish and equipment. Steam will be supplied by two boilers of 150 horse power each. The second dredge is to be of the elevator type, and will be built for use primarily on the Erie canal. Removable pontoons will be provided on each side, so as to enable the craft to pass the locks. With the pontoons on, she will measure 98 by 34 feet with 7 feet sides. Engines of this dredge will also be double, 10 by 14 inches. She will be capable of handling from 1,500 to 2,000 yards of material daily. The cost of the large dredge will be about \$55,000. This has no reference of course, to tugs or scows that will attend her operations. The smaller dredge will cost about \$20,000.

Referring to the efforts that are being made in Germany to bring about the expenditure of large sums of money for an increase in the naval strength of that country, the United States consul at Mainz says that the most important reasons advanced for these expenditures are based upon the necessity of protecting Germany's foreign commerce and the interests of German merchants and traders settled in foreign countries. Statistics are given by the consul to show that Germany's commerce has greatly increased within the last few years. According to these figures, in 1881 Germany's foreign trade amounted to 6,337,000,000 marks, or \$1,508,206,000. In 1895 it amounted to 7,448,000,000 marks, or \$1,772,624,000. It may be claimed, says the consul, that this increase is due to the general increase in the world's commerce, but, he says, this does not seem to be the case, for in the time from 1881 to 1895, during which Germany's commerce increased about \$246,418,000, England's commerce decreased by about \$190,400,000; that of France decreased by about \$142,800,000, and that of Russia by about \$71,400,000.

Among the New Year honors conferred by Queen Victoria was that of a Companionship of the Order of St. Michael and St. George on James Dredge, editor of Engineering. Mr. Dredge was one of the British commissioners to the World's Columbian Exposition.

Politics in the Canal Trouble.

Editor Marine Review:—I notice that the Review is doing something, along with a large number of the members of the eastern press, towards the spread of uneasiness in regard to the Erie canal, though possibly it has formed a policy of merely "passing along" the sweeping charges and making use of the favorite word "scandal" in a headline. There is certainly no harm in a dispassionate and enlightened discussion of the situation, though the west ought to be warned at the outset that the utterances of New York city and state papers, and even of Buffalo papers to a certain extent, are too generally inspired by state and personal politics to be accepted as the whole of the case. It is not easy to understand why even these lofty and always potent motives should warrant anyone in jumping at a conclusion that is certain to hinder the work of canal restoration that must again be taken up in earnest by the people of the state.

There is no denying that the disappointment over the failure of the appropriation of \$9,000,000 to give the canals an additional 2 feet of water is very great, but there is no reason as yet for calling anyone a thief, however eagerly party journals may be seeking for material out of which to raise a hue and cry against an opponent. There is not yet evidence enough in for an unbiased opinion. It is well known that contractors did not accept the estimate of \$9,000,000 when it was first made. They said at once that they would get at least \$12,000,000, if not \$20,000,000 out of it. There is, so far as I can see, nothing in this more than a rather low estimate of the ability of state officials to compute the cost of such a work, or at the most to accuse them of the pious fraud of understating this cost in order not to frighten the voters. It may be in order to treat such official errors with severity, but if thieving is to be proved it must be found in the after management of the work.

There is to be an inquiry into the manner of expending the appropriation, both by officials and otherwise. The one that will carry most weight ought to be that which Robert R. Hefford of Buffalo, as chairman of the executive committee of the commercial bodies of the state, is preparing to begin. To him as much as any one is due the success of the effort to obtain the \$9,000,000 appropriation, and he expresses himself as not only prepared to resume the work with all former earnestness in spite of the racket, but he has no doubt that the people will stand by the canal as they have always done. He will express no opinion as to the charges, holding that they are not proven. What Mr. Hefford does will be without shadow of political bias and in the public interest wholly.

Buffalo, N. Y., Jan. 11, 1898.

JOHN CHAMBERLIN.

Passenger Traffic of Atlantic Liners.

Customs officials of New York have prepared a table, which is printed herewith, showing the number of passengers landed at that port during 1897 by the Atlantic liners. The totals are 192,004 steerage and 90,932 cabin passengers. The North-German Lloyd ships carried the greatest number of steerage passengers. In cabin passengers the Cunard company leads with 15,196 from Liverpool, but the American line is a close second with 14,443 from Southampton.

Name of Line.	Where from.	Cabin.	Steerage.	Trips.
North German Lloyd.	Bremen	12,589	24,542	112
North German Lloyd.	Mediterranean	2,607	15,873	37
White Star.	Liverpool	10,104	19,271	53
Cunard.	Liverpool	15,196	17,303	61
American.	Southampton	14,443	11,322	53
Red Star.	Antwerp	4,493	10,557	52
Hamburg-American.	Hamburg	10,556	15,270	88
Hamburg-American.	Mediterranean	310	2,063	5
Anchor.	Antwerp	28	14,966	32
Anchor.	Glasgow	6,450	4,406	40
Holland-America.	Rotterdam	2,792	8,676	54
Holland-America.	Amsterdam	79	1,827	17
French.	Havre	6,044	14,264	52
French.	West Indies	143	—	10
Fabre.	Mediterranean	22	11,374	29
Atlantic.	Mediterranean	82	7,289	9
Thingwalla.	Copenhagen	860	3,201	23
Union.	Hamburg	—	2,332	20
Baltic.	Stettin	—	2,227	22
Allan-State.	Glasgow	1,823	1,050	27
Prince.	Mediterranean	11	1,010	1
Empreza Insulane de Navegacao.	Lisbon	126	958	12
Linha de Vapores Portuguezes.	Oporto	71	877	8
Bordeaux.	Mediterranean	—	802	1
Bordeaux.	Bordeaux	40	118	4
Atlantic Transport.	London	1,820	—	51
Miscellaneous.	—	243	436	28
Total.		90,932	192,004	901

Realizing the advantages of gas buoys as applied on the lakes to the lighting of channels, shoals, etc., the commercial bodies of Galveston, New Orleans, Jacksonville, Tampa, Mobile and other southern ports will make a special effort to have congress provide funds for a large addition to the number of these buoys now in use in the south. It has been proposed to have congressmen from the lakes and from gulf states join in trying to secure a large special appropriation for this purpose, but as the Lake Carriers' Association has already systematized its dealings with lighthouse officials, it is hardly probable that such a union can be brought about. Representatives from the lakes will, however, be found ready to assist the work on the gulf, as they have a full knowledge of the value of these buoys in their own districts. The Marine Journal of New York says that the application of the Pisch gas system of lights to the elevated railway cars of New York by the Safety Car Heating & Lighting Co. of that city has turned night into day on the cars.

New officers of the Detroit harbor, American Association of Masters and Pilots of Steam Vessels are as follows: Captain, H. C. McCallum; first pilot, B. F. Ogden; second pilot, P. H. Trezise; purser, D. A. McLachlan; captain's clerk, E. A. V. McLachlan; chaplain, B. C. Chamberlain; starboard quartermaster, Samuel Moore; port quartermaster, H. J. Fortain; saloon watchman, William Wilson; forward deck watchman, David Sidney; delegate to the thirteenth grand voyage at Washington, H. C. McCallum.

Lake Erie-Ohio River Ship-Canal.

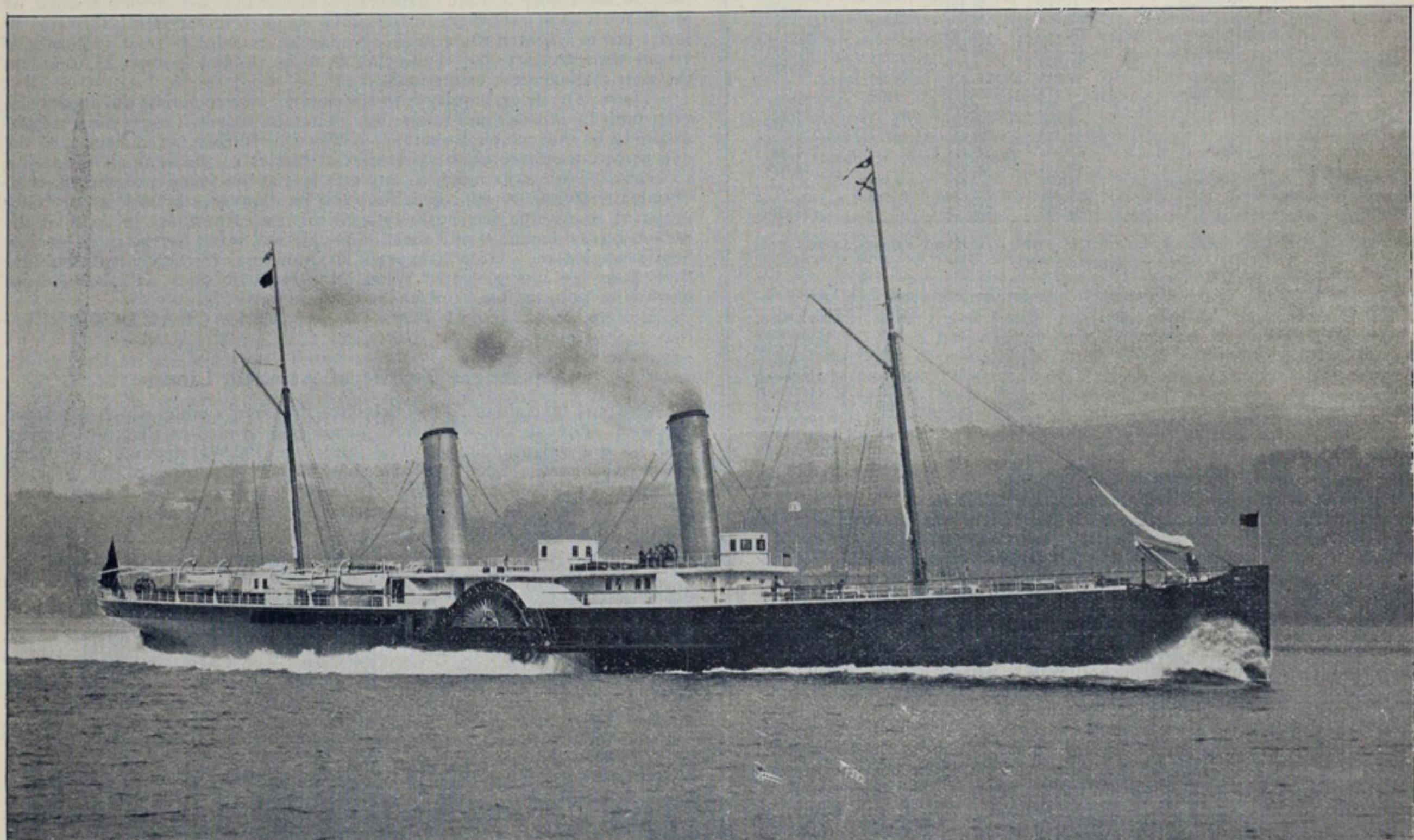
On several occasions it has been said in these columns that from a commercial point of view the Lake Erie-Ohio river ship-canal scheme, which is again being boomed in Pittsburg, is not worthy of the attention of congress, even to the extent of making an appropriation for a survey. It is quite certain that a similar opinion is entertained by everybody—excepting the canal advocates of Pittsburg—who has any knowledge of the conditions necessary to make a ship-canal profitable, or who has stopped to consider the enormous cost of any kind of a canal, even for 10 feet navigation, between Lake Erie and Pittsburg. For stating this opinion in the Review of Dec. 16 last, we are charged with shortsightedness on the subject of waterways development by Mr. John E. Shaw of Pittsburg, secretary of the canal provisional committee, who says:

"When the scales drop from the eyes of the Marine Review and from the admitted advantages of lake transportation it can see and comprehend that the extension of similar advantages in all directions possible, especially to the coal and coke fields, will enlarge the commercial opportunities of Cleveland, and further see that the introduction of water transportation wherever possible always has and always will promote the commercial welfare and importance of any community, then the Review will look upon its declaration of Dec. 16, 1897, as the view of the man

A Canadian Pacific Enterprise.

The three stern-wheel river steamers building in Toronto—two at the Bertram Engine Works and one at the Polson Iron Works—for the Canadian Pacific Ry., will be operated in connection with the two ocean-going freight and passenger steamers, *Tartar* and *Athenian*, which the Canadian Pacific officials recently purchased in England from the Union Steamship Line. These two steamers are now being prepared in England for the Pacific service. Both of them were built at the works of Aitken & Mansel of Glasgow, while Robert Logan, naval architect of Cleveland, was employed with that firm. The *Tartar* was designed by Mr. Logan. The Canadian Pacific will use these steamers in the establishment of regular freight and passenger communication between Vancouver and Fort Wrangell, at the mouth of the Stekeen river. The small vessels building in Toronto will be used for the river service. Each of the ocean-going steamers will do the trip within three days. A dispatch from London says they will start for Vancouver, via the Cape of Good Hope, in February, and in all probability will take out a fair number of passengers, as the company is arranging to boom them as the safest and cheapest means of getting to the Klondike.

The *Tartar* is 376 feet keel, 47 feet beam, 30 feet depth, and of 4,339 gross tons. She has accommodations for 109 first-class, 152 second-class



ONE OF THE BRITISH-BUILT FAST CHANNEL PASSENGER STEAMERS.

standing in a tub who could only see the rim and took it for the horizon, and thought there was no world lying beyond it."

It would, no doubt, be a good thing to extend the advantages of lake transportation to the furnaces and coal regions of the Pittsburg district, but these advantages are principally in 6000-ton ships that require plenty of water to float in. The lakes were here and all that was required was the dredging of connecting channels, also provided by nature. The dream of this ship-canal is another matter. To be effective it would almost equal in cost, on account of its great length, the proposed ship-canal from the lakes to the Atlantic seaboard, and would end nowhere, while the enlargement of the Erie canal, or other routes suggested for an outlet to the seaboard, would open up to the lakes the ports of the world. We are told that one of the main objects of this Lake Erie-Ohio river ship-canal is to save expensive handling charges on iron ore and coal at Lake Erie ports. The Pittsburg advocates of the canal would have the ore delivered from lake ships at the furnace yards and would load the coal direct from the mines. In order to do this, would they zig-zag the canal to the furnaces and mines, or would they rip up these costly plants and remove them to the banks of the canal? Some such wonderful task must be undertaken if the service of railways and charges for handling cargo as they now exist are to be radically reduced. The influence of the great iron interests of Pittsburg would have secured assistance from the general government for this canal scheme long ago if there was any merit in it.

All the builders of steel ships on the lakes have been asked by Cleveland parties to submit bids on a freight steamer of 410 feet keel, 50 feet beam and 28 feet depth. The steamer will undoubtedly be built, as arrangements have been made for placing practically all of the stock. The management will be in a Cleveland office that already controls a large number of vessels.

and 153 third-class passengers. She was built in 1883, but was re-engined in 1888. Her engines are triple expansion with cylinders of 36, 58 and 94 inches diameter by 60 inches stroke. The horse power is about 4,900 and speed 15 knots. The *Athenian*, built in 1881, is 365 feet keel, 46 feet beam and 29 feet depth. Her freight capacity at 23 feet is about 3,300 tons and she has accommodations for about 325 passengers.

Chicago drainage canal officials have awarded to the King Bridge Co. of Cleveland the contract for a swing bridge that will be the largest structure of its kind in the world, the next largest being that over the Harlem river on the line of the New York Central railway. The bridge will cross the drainage canal at Campbell avenue, Chicago, and will have eight railway tracks. It will cost about \$320,000 and is to carry the tracks of the Pittsburg, Cincinnati, Chicago & St. Louis Ry., Chicago & Northern Pacific Ry., and Union Stock & Transit Co. The length is 416 feet, width 112 feet, and weight of steel 4,000 tons.

Following the announcement of an order given by Col. Oliver Payne to the Bath Iron Works for a costly steam yacht is a report from London that Jas. Gordon Bennett has commissioned G. L. Watson, the famous yacht designer, to make plans for a steam yacht of 3,000 tons, the vessel to be ready for use next season. Col. Payne's yacht is to be 350 feet long, 35 feet beam and draw about 16 feet of water. She will have triple expansion engines with single screw, and a guaranteed speed of 15 knots on natural draft for forty-eight hours. This order to the Bath works comes of Col. Payne making a cruise in foreign waters on Mr. W. H. Slater's yacht *Eleanor*, which was built at Bath.

Capt. Ralph C. Brittain is said to be building a towbarge at Saugatuck.

SEVENTY-EIGHT IRON MINES

SHIPPED 12,457,002 GROSS TONS FROM THE LAKE SUPERIOR MINING REGION IN 1897—TABLES GIVING SHIPMENTS OF EACH MINE.

Through the courtesy of mining companies and dock managers at all ore shipping ports, the Review is enabled to present a complete report of iron ore shipments from all mines in the Lake Superior region that were operated during 1897. The total, including ore shipped to furnaces by rail, is 12,457,002 gross tons, compared with 9,934,446 tons in 1896 and 10,429,037 tons in 1895. The 1897 output is therefore full 2,000,000 tons in excess of the greatest output of previous years. There were seventy-eight mines on the shipping list in 1897, against eight-four in 1896, eighty-six in 1895 and sixty-seven in 1894. Rail shipments of 1897 foot up 241,357 tons, compared with 290,410 tons in 1896 and 194,127 tons in 1895.

SHIPMENTS BY RANGES.

	1897.	1896.	1895.
	Gross Tons.	Gross Tons.	Gross Tons.
Marquette Range	2,702,399	2,603,839	2,097,838
Menominee Range	1,937,013	1,560,467	1,923,793
Gogebic Range	2,258,236	1,799,971	2,547,976
Vermilion Range	1,278,481	1,088,090	1,077,838
Mesabi Range	4,280,873	2,882,079	2,781,587
Total	12,457,002	9,934,446	10,429,037

SHIPMENTS BY PORTS.

	1897.	1896.	1895.
	Gross Tons.	Gross Tons.	Gross Tons.
Escanaba	2,302,121	2,321,931	2,860,172
Marquette	1,945,519	1,564,813	1,079,485
Gladstone	341,014	220,887	109,211
Ashland	2,067,637	1,566,236	2,350,219
Superior	531,825	167,245	117,884
Duluth	2,376,064	1,988,932	1,598,783
Two Harbors	2,651,465	1,813,992	2,118,156
All-Rail	241,357	290,410	194,127
Total	12,457,002	9,934,446	10,429,037

MARQUETTE RANGE.

Mines.	Gross Tons.	Mines.	Gross Tons.
Blue	2,519	Negaunee	182,169
Cambria	110,648	Queen	239,774
Champion	141,728	Republic	124,342
Cleveland-Cliffs Iron Co.	718,408	Richards	6,887
Dexter	1,154	Richmond	4,630
Jackson	79,102	Rolling Mill	3,975
Lake Angeline	489,685	Star West	942
Lake Superior	376,761	Winthrop	106,894
Lillie	112,781	Total	2,702,399

MENOMINEE RANGE.

Mines.	Gross Tons.	Mines.	Gross Tons.
Antoine	98,847	Loretto	54,104
Aragon	149,594	Mansfield	37,182
Chapin	643,402	Mich. Explor. Co.	216
Commonwealth	98,283	Millie	10,374
Columbia	24,623	Penn Iron Mining Co.	237,886
Crystal Falls	95,210	Pewabic	279,855
Cundy	41,942	Sheridan	146
Dunn	31,062	Youngstown	661
Florence	37,594	Total	1,937,013
Hemlock	96,032		

GOGEBIC RANGE.

Mines.	Gross Tons.	Mines.	Gross Tons.
Ashland	111,625	Newport	150,979
Atlantic	50,307	Norrie	604,281
Aurora	196,122	Pabst	220,496
Protherton	46,186	Palms	208,682
Cary	37,308	Pence	120
Colby	22,921	Shores	16,102
Germania	1,015	Sunday Lake	45,815
Iron Belt	95,727	Tilden	276,890
Jack Pot	1,265	Windsor	385
Mikado	11,397	Total	2,258,236
Montreal	191,106		

VERMILION RANGE.

Mines.	Gross Tons.	Mines.	Gross Tons.
Chandler	438,365	Zenith	40,817
Minnesota	592,196	Total	1,278,481
Pioneer	207,103		

MESABI RANGE.

Mines.	Gross Tons.	Mines.	Gross Tons.
Adams	175,802	Lake Superior group	259,912
Auburn	175,263	Mahoning	519,892
Biwabik	427,464	Mountain Iron	773,538
Cincinnati	32,912	Norman	101,077
Cloquet	12,215	Ohio	47,350
Commodore	60,798	Oliver	601,072
Fayal	642,939	Penobscot	11,933
Franklin	30,123	Roberts	18,614
Genoa	309,514	Sparta	66,722
Hale	13,728	Total	4,280,873

Among the big producers are the following: Mountain Iron, 773,538 tons; Oliver, 601,072; Fayal, 642,939; Mahoning, 519,892; Biwabik, 427,

464; Norrie and Pabst, 824,777; Minnesota, 592,196; Chandler, 438,365; Chapin, 643,402; Cleveland-Cliffs Iron Co., 718,408; Lake Angeline, 489,685.

It is expected to publish with the next issue the large table giving mine shipments during 1897 and for the preceding forty-two years.

New Officers among the Engineers.

The national convention of the Marine Engineers' Beneficial Association will open in Washington on Monday, the 17th inst., and will continue until about the 23d. Officers for the coming year, elected recently in several branches on the lakes, are as follows:

Cleveland, Branch 2: President, William H. Kennedy, jr.; vice-president, Henry W. Burton; recording secretary, Silas H. Hunter; financial secretary, Henry T. MacAuley; treasurer, Evans Jenkins; corresponding secretary, Herbert H. Farr; chaplain, A. L. Wilcox; conductor, George Allen; inner doorkeeper, J. G. Donahue; outer doorkeeper, David Conway; trustees, William H. Kennedy, M. B. Sturtevant, H. T. MacAuley; representative to Washington, Fred Harmon; alternate, William H. Kennedy.

Sturgeon Bay, Wis.: President, A. C. Cofrin; vice-president, W. O. Helmholz; recording secretary, E. D. Weber; corresponding secretary, C. O. Chapman; financial secretary, H. Devine; treasurer, F. A. Ives; conductor, F. Kimber; doorkeeper, H. Dummann; chaplain, O. Sanders; outer doorkeeper, Joel Ashby; board of trustees, F. A. Ives, W. O. Helmholz and O. Sanders; national representative, O. Sanders.

Toledo, O.: President, Bert Ransom; vice-president, Alpha Page; recording secretary, James L. Aznoe; corresponding and financial secretary, E. D. Locke; treasurer, F. N. Wise; conductor, Eugene Pasano; doorkeeper, F. J. Cunningham; representative to the national convention at Washington, D. C., James L. Aznoe.

Saginaw, E. S., Mich., Branch 92: Past president, Joseph D. Budd; president, Geo. A. Thrasher; vice-president, Joseph Huber; treasurer, Chas. H. Morgan; corresponding secretary, Joseph D. Budd; recording secretary, Peter McLearn; financial secretary, Walter A. Henry; conductor, Wm. Herbert; doorkeeper, Fred Pflueger; representative, John Henry; chaplain, A. G. Moll.

Buffalo, N. Y., Branch 1: President, James L. Walker; vice-president, Wm. Meade; treasurer and financial secretary, Peter Burns; recording secretary, Geo. M. Campbell; corresponding secretary, Theo. A. Meyers; doorkeeper, M. F. Harmon; conductor, James Wixted; chaplain, Frederick Hale; representatives, Theo. A. Meyers and Alfred E. Welch.

Ohio Coal Sales Arrangement.

It has been practically settled that the railroads belonging to the Ohio Coal Traffic Association will operate upon a new basis this year. While the central selling agency plan will not be fully adopted, an important step in that direction will be taken by placing supervision over the trade. This means that the coal companies, such as the General Hocking, Baltimore & Ohio and Sunday Creek Co's, will report all sales to a state supervisor, and in this way it is confidently expected that the selling price will be fully maintained. Railroad officials and coal men attribute the slump in prices and rates to fierce competition between selling agents, and they hit upon the supervision plan in order to keep up prices generally.

General Manager Woodford of the C. L. & W. Ry. says:—"When we first formed the association, we agreed upon a certain division of business, each of the mine operators and each of the coal carrying roads to have a certain percentage of the business resulting. This percentage proved to be inequitable and we got together to adopt a new schedule. In order to insure a division of business according to percentages, we will appoint a managing director, who will have charge of the distribution of certain orders to the various mines and railroads, so that each operator and each railroad will be certain to get its just dues. Previously we have not been very successful in the division of the business according to our agreement, but the managing director will be vested with power to insure it in the future. The managing director has not yet been appointed, nor has the location of his headquarters been selected."

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Jan. 8, 1898:

	Wheat, bushels.	Corn, bushels.
Chicago	10,801,000	15,169,000
Duluth	2,157,000	1,772,000
Milwaukee	132,000	112,000
Detroit	159,000	85,000
Toledo	287,000	622,000
Buffalo	1,568,000	2,970,000
	15,104,000	20,730,000

As compared with a week ago, the above figures show, at the several points named, a decrease of 280,000 bushels of wheat and an increase of 293,000 bushels of corn. On the same date there was afloat at Chicago 357,000 bushels of wheat, 4,377,000 bushels of corn, 89,000 bushels of rye and 93,000 bushels of barley; and at Buffalo 559,000 bushels of wheat 195,000 bushels of corn and 84,000 bushels of rye.

About 5,500



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

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The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,106.47
Total.....	3,333	1,324,067.58
The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:		
Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
Total.....	864	444,216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canals.			Suez Canal.		
	1896*	1895*	1894	1896	1895	1894
Number of vessel passages.....	18,615	17,956	14,491	3,409	3,434	3,352
Tonnage, net registered.....	17,219,418	16,806,781	13,110,366	8,560,284	8,448,383	8,039,175
Days of navigation.....	232	231	234	365	365	365

* 1895 and 1896 figures include traffic of Canadian canal at Sault Ste. Marie.

Our own Columbia and Minneapolis were among the first of the big triple-screw cruisers, but the idea of triple screws was not original in this country. It originated in Italy. The first experiment was made on small torpedo cruisers, the first to be launched being the Tripoli of 841 tons, 3,600 horse power, and 20 knots. This was in 1886. This was followed by three similar boats, the Goito in 1887 and the Montebello and Mouyambano in 1888. The next experiment on a large scale was made in France with the Dupuy de Lome, built at Brest and launched in 1890. This vessel is an armored cruiser of 6,300 tons and 1,400 horse power, with a speed of about 20 knots, and a complete armor of 110 millimetres. It was two years later that the German protected cruiser Kaiserin Augusta, and the American Columbia came. Both were launched in 1892. The Minneapolis came in 1893. Then France was the first to adopt the three screws disposition on the first-class ironclads. The Massena of 11,900 tons and 13,600 horse power was the first ready. It was built at St. Nazaire, launched in 1895, and now belongs to the French channel squadron. After this came the sisterships Charlemagne, Bouvet, St. Louis, Gaulois, all of them launched and now being completed. The French cruisers Guichen and Chateau Renault, now completing at St. Nazaire and La Seyne, may be considered as improved Columbias.

In the iron trade the tide is rising surely, although almost imperceptibly. The main channel is full and we may soon find the river overflowing its banks. In many branches, notably in the cruder forms, the rush for winter work is over and the leading sellers are well filled with orders for the next three to four months to come. The business has been taken at low prices, modestly remunerative to the best equipped and located works, and for some time to come they will probably remain indifferent, willing to let events shape their course until buyers again come into the market. The conviction now is quite general that by that time sellers will be in a position to demand an advance. Concerning the wire consolidation there is very little that is new. It is understood that the work of the appraisers and accountants is progressing more rapidly than was expected. The application for an Illinois charter, with a capital increased from the original \$70,000,000 to \$87,000,000, indicates that some large interest must have been added to the first coterie. The sum is suggestive.—Iron Age.

It is certainly unfortunate for the vessel interests of the lakes that changes are so often made among naval officers in charge of light-house affairs. Before the vessel men can become acquainted with an inspector, and before the inspector himself can possibly have a full knowledge of all the details of his district, a change is announced from Washington. With the opening of another season of navigation new officers will be in charge of all three of the important lake districts. Commander E. H. C. Luetze of the ninth district, Chicago, has already been succeeded by Lieut. Commander Charles O. Allibone. Commander Folger of Detroit is to be succeeded by Lieut. Commander Duncan Kennedy, and Commander T. F. Jewell of Buffalo gives place to Commander Franklin Hanford.

Engineers from this country who attended the congress of naval architects and marine engineers in London in July last, heard some of the highest English authorities at that great gathering refer to the Turbinia as a toy that had no real place in a discussion about ships, and yet the

English engineering journals lavish space on this vessel and the plans of a company that has been formed to develop the turbine engine for ships. It is now said that during the present month the Turbinia will be given another trial, when, her inventor asserts, she will make at least 60 miles an hour. One great disadvantage noted at the experiment in June, he believes, has been overcome. Then, with the engines reversed, she could make only 3 knots an hour; now it is said she can make 10. There are now three rotary turbines in the engine room, instead of two, through which the steam passes in turn and goes through a cycle of complete expansion. The enormous rate at which the turbines revolve necessitates three propeller shafts, each fitted with three screws. These revolve at 36 2-3 revolutions a second.

The navy department is certainly meeting with a great deal of trouble on account of defective work in the building of the big No. 3 dry dock at Brooklyn navy yard, repairs to which were described and illustrated in a recent issue of the Review. All but \$8,000 of the \$100,000 appropriated by congress for repairs has been expended, and unless an additional appropriation of \$20,000 is made at once the work must stop. It is understood that a court of inquiry will be ordered to investigate the work done by the contractor who built the dock. Naval Constructor Bowles, who has been in charge of repairs, reports that the contractor's work was defective, and the report of the board of civil engineers confirms some of his statements. Mr. Bowles intimates that the great leaks which appeared in the dock were not so much due to dredging as to defective work. It is expected that Civil Engineer A. G. Menocal, who had charge of construction of the dock, will be called home from Nicaragua to give evidence before the board.

In discussing with a representative of the New York Times, a few days ago, the commercial outlook from an American point of view, James J. Hill of Great Northern railway fame said: "There is one thing that stands in the way of the railroads at the present time—the pitiable condition of the merchant marine, and the consequent inability of the railroads to secure ocean transportation for the goods they can bring to the coast." Mr. Hill asserts that if we had the carrying capacity on the ocean that we have on the land, we could more than double our trade with Asia at once. "On the land we lead the world in carrying facilities, and at rates less than half those that obtain in other countries. On the ocean we are outdone by every nation. The railroads can solve the problem until salt water is reached; then they must stop. Intelligent action on the part of congress is needed to so modify our shipping laws that there can be built up American fleets that can compass on the water what the railroads have done on the land."

A statement prepared by the navy department places the property value of the various navy yards and naval stations of the government at over \$60,000,000, of which \$54,000,000 represents the value of real estate and chattels and \$7,000,000 that of machinery. The navy yard at New York is estimated to be worth a little more than \$16,000,000, and that at Boston between \$10,000,000 and \$11,000,000. The Norfolk navy yard is valued at \$6,000,000 and that at Mare Island at \$5,500,000. The ordnance factory at Washington is valued at \$7,000,000, including plant and everything complete for the manufacture of great guns. The League Island navy yard is estimated to be worth \$3,500,000; the Portsmouth yard, \$3,100,000; that at Pensacola \$2,000,000, and the new naval station at Puget sound \$800,000, while the valuation of the naval academy grounds is placed at about \$800,000.

There was produced on the Saginaw river during the season of 1897 a total of 352,306,349 feet of lumber, of which 13,029,998 feet was hardwood and 7,762,116 feet hemlock. At the close of the season there was in the hands of the manufacturers a total of 184,519,342 feet of lumber. The lumber output in 1896 was 316,797,879 feet, and there was on hand at the close of that year a total of 217,498,058 feet. The figures showing stocks on hand do not include lumber in the hands of dealers who do not operate manufacturing plants. There was manufactured during the year a total of 41,674,250 shingles, against 38,180,700 during the season of 1896. There were no shingles of consequence on hand at the close of last season, the demand having been good and the stocks were wanted as fast as manufactured. The Saginaw river mills also produced last year 55,067,850 pieces of lath.

A first order from the Pennsylvania Company for steel rails to be used during the coming year is looked upon as an item of importance in the iron trade. The amount is larger than is usually given at this time and is divided among the concerns that usually furnish rails to the Pennsylvania Company. The amount ordered is 100,000 tons, divided among the following companies: Pennsylvania Steel Co., 25,000; Cambria Iron Co., 25,000; Carnegie Steel Co., 30,000; Lackawanna Iron Co., 5,000 and the Illinois Steel Co., 15,000 tons.

A dispatch from Buffalo stating that lake underwriters lost money during 1897, and would have been heavier losers but for reinsurance of fire risks, is taken by most vessel owners as a joke. Some interests represented in Buffalo may have found, upon summing up amounts paid out on account of the stranding of steel vessels, that their premiums were not much in excess of losses, but as a whole the insurance business of 1897 was certainly profitable.

It is expected that the big battleships Kearsarge and Kentucky, building at Newport News, will be launched about the end of next month. Three torpedo boats will also be launched shortly—the Talbot, under construction by the Herreshoffs; the Mackenzie, being built by the Chas. Hillman company at Philadelphia, and the Davis, under construction at the works of Wolf & Zwicker.

H. Maitland Kersey has given up the New York agency of the White Star line, having become interested with L. Z. Leiter of Chicago and Ogden Mills in a Klondike gold mining scheme.

Interest in Naval Affairs on the Lakes.

The navy department has found the lakes to be the best field in the country for recruiting purposes, and this fact will be used as an argument in support of Senator McMillan's bill providing for a modern gunboat to replace the old Michigan. The department will undoubtedly establish on the lakes, as soon as it is possible to do so, a permanent recruiting station. Congressman T. E. Burton has been preparing data in support of the establishment of such a station at Cleveland. It is claimed that the establishment of a recruiting station and the construction of a new gunboat will tend to greatly increase interest in naval affairs on the lakes. Congressman Boutell of Illinois, who has introduced in the house a bill similar to that introduced by Mr. McMillan in the senate, is of the opinion that the proposed new gunboat, on which the lake divisions of the naval reserve could take an annual cruise, would stimulate interest in this important branch of our service, and would permit also of the Michigan being turned over to one of the reserve organizations for practice purposes. He says:

"The navy department is making constant efforts to Americanize the navy. Of the 2,845 petty officers of our navy, 83 per cent. are citizens of the United States; but only 48 per cent. are native born. Of the other men, 70 per cent. are citizens of the United States, while 58 per cent. are foreign born. Every patriotic citizen must approve of any measure that has for its object the manning of United States ships with United States citizens. A well organized, well trained, enthusiastic naval militia will prove the best material from which to recruit good new men for the regular navy in case of need. Our national guard is organized in every state and territory and in the District of Columbia, and numbers about 120,000 men in active service. The naval militia is organized in only seventeen states and numbers less than 4,000 men. We ought to have one or more divisions of the naval militia in every large port on our seaboard, on the gulf, the great lakes, and our large rivers.

"The report of the secretary of the navy shows that the interest in the naval reserves is steadily increasing, and that the navy department has exhausted its supply of old vessels assigned as training ships for the use of the naval militia. For this reason I have included in this bill a provision that the venerable paddle-wheel bark Michigan, after which the lake and state of that name are supposed to have been named, shall spend its last days in the magnanimous task of training young men for the proper performance of their duties on her successor. I do not think that the construction and maintenance of a modern gunboat on the upper lakes would be in contravention of the existing agreement between our country and Great Britain, and no measure which could be so construed would have my sanction. In my judgment, however, it would be wise and advantageous to put the treaty which now regulates the naval force to be maintained by the two governments on the great lakes in some form which would meet the requirements of modern naval architecture and the demands of the immense commerce and population that have grown up on the great lakes."

Ohio Mining Engineers.

An extensive programme has been arranged for the winter meeting of the Ohio Institute of Mining Engineers, which takes place at Columbus Jan. 19 to 21 inclusive. Members of this organization are largely interested in the bituminous coal mines of Ohio. Among the papers are the following: "A Topographical Survey of the State of Ohio," by Prof. A. A. Wright of Oberlin; "What We Pay For," by the Hon. Frederick C. Keighley of Uniontown, Pa.; "Eminent American Geologists," by Capt. J. L. Morris, Carrollton; "The Isser vs. the Wuzzer," some reminiscences of past and present mining, with a glimpse into the future, by J. S. Doe, Wilmington; "Some of the Conditions Affecting the Designing of Motors for Mining Purposes," by Prof. F. C. Caldwell of O. S. U., Columbus; "Progress in Coal Unloaders During 1897," by W. B. Hanlon, chief engineer C. L. & W. Ry., Cleveland; "Surface Plants of Bituminous Collieries," by W. G. Wilkins, C. E., Pittsburgh, Pa.; "Gases Met with in Mines: Their Specific Gravity," by Wm. Ralston, C. E., Newman; "Fire in Sunday Creek Coal Co.'s Mine No. 10," by Edward H. Coxe, Corning; "The Practical Part of Electrical Haulage," by D. C. Thomas, C. E., Gloucester; "Geology of the Jackson Shaft Coal," by the Hon. Andrew Roy, Glen Roy; "Endless Rope Haulage," by H. M. Morrison, C. and M. E., Scranton, Pa.; "Mistakes in Coal Mining," by Wm. Hibbs, Dugger, Ind. Mr. R. M. Haseltine of Columbus is secretary-treasurer of the Ohio Institute of Mining Engineers.

Two forces of workmen have for some time past been regularly engaged at the works of the Roberts Safety Water Tube Boiler Co., Redbank, N. J., the plant being constantly employed, night and day, under direction of a superintendent and assistant superintendent. Following is a list of orders for twenty-eight water tube boilers now in hand: One boiler for passenger steamer for Bath Iron Works, Bath, Me.; two for dredge for New England Dredging Co., Boston; two for new steam yacht for Geo. Lawley & Son Corporation, South Boston; two for steam yacht Embla for John T. Williams, New York; two for steam yacht building for E. W. Bliss by Erie Basin Dry Dock Co., Brooklyn; three for South American steamers building at Crescent Ship Yard, Elizabethport, N. J.; two for large tug building at works of Union Dry Dock Co., Buffalo; two for passenger steamer Sarah A. Jenks, ordered by Capt. Jos. Jenks, Sing Sing, N. Y.; one for yacht for Chas. L. Mitchel, New Orleans; two for two passenger steamers for D. C. Whitlock, New York; one for yacht for C. J. Bates, Lake George, N. Y.; one for steam yacht Althea for Chas. Sooysmith, New York; four for Yukon steamers to be built by Moran Bros. Co., Seattle, Wash.; one for steam yacht Nirvana, for Wm. R. Sands of New Hamburg; one for steam yacht Nada, for Chas. R. Flint of New York; one for new steam yacht for Henry R. Stickney of Portland, Me.; one for shop use for Union Iron Works, San Francisco.

Wm. A. Fairburn, naval architect of Bath, Me., has returned to this country after an absence of two years, devoted to a study of ship building in Scotland and England.

When is a Boiler not a Boiler?

The great engineering-trade strike in England has directed attention all over the world to the subject of trade unions and their relations towards employers. The discussion has had special reference to the power of these unions in Great Britain.

"One of the most remarkable of all the disputes between the unions themselves," says Benjamin Taylor in *Cassier's Magazine*, "was that between the Boilermakers' and the Engineers' unions, as to which trade belong properly certain portions of the work of making Belleville water tube boilers. The one union claimed that each tube is, *de facto*, a boiler, and that, therefore, the fitting belongs to the boilermakers. The other union claimed that the water tube boiler is not a boiler until all the tubes are fitted together, and that, therefore, the work of fitting is the work of an engineer fitter. Long and furious was the contest waged over this question, which, undoubtedly, was as interesting as it was novel. The Belleville boiler was not only a remarkable invention, but it raised the conundrum, 'When is a boiler not a boiler?' It brought two of the largest and most powerful trade unions in the world into such heated contact as to threaten a trade union war of disastrous magnitude. For months the dispute went on, until the two societies came into conference, at which they were unable to agree on either the definition or division of the work. At last it was agreed to submit to the arbitration of Mr. David J. Dunlop, the eminent ship builder of Port Glasgow, who called the parties before him and heard the evidence and arguments on both sides in a most judicial, as well as judicious, manner. What he had to decide was on the claim of the boilermakers' society to 'the right to connect all tubes and expand them when necessary, also to test all tubes and erect all the elements and put in all the doors, large or small,' in the construction of water tube boilers. This claim was founded upon the industrial right of boilermakers to make boilers; but was resisted by the engineers' society, on the ground that so great has been the transitions in the Belleville boiler that it has lost all the characteristics of a boiler and can be regarded only as an elaborate piece of mechanism, the putting together of the elements of which is the work of an engineer. For the preparation of the tubes and the various items forming the elements the boilermakers made no claim. The dispute really turned on the fitting together of the elements to form the complete boiler, and this is work which is quite capable of being done by either class of workmen. Mr. Dunlop, however, decided that the particular portion of work which formed the subject of reference is boilermakers' work. This decision by no means pleased the Amalgamated Society of Engineers, and, though they have abided by it, the breach between them and the boilermakers' society has never been healed."

Reduction in Salvage Award.

A salvage case recently passed upon by the United States circuit court of appeals at Richmond, Va., is of interest on account of a reduction made in a large claim that had been allowed by the district court. The case was that of the Merritt Wrecking Co. of New York against the British steamer Haxby. The district court (Judge Hughes, eastern district of Virginia) had awarded the salvors \$27,500. The circuit court of appeals reduced the award to \$16,666. Owners of the vessel admitted the meritorious character of the service, but disputed the reasonableness of the amount claimed, and it is understood they offered to pay \$15,000 before the commencement of the suit. They accordingly appealed, and the details, as given in the opinion of Circuit Judge Goff, are of interest. The Haxby is a modern steel vessel fitted with triple expansion engines of 3,445 gross tons. Her dimensions are 330 feet length, 43 feet beam and 21 feet depth. She went ashore at night abreast of Dam Neck life-saving station, on the eastern shore of Virginia. Though drawing 12 to 15 feet of water, she crossed a shoal over which there was only 6 feet at low tide. She lay about 30 feet from the beach at low water, and broadside on. The wrecking concern next day arrived with an outfit and got the Haxby off, towing her to Newport News. For this work they claimed \$40,000. The value of the property they employed was about \$117,000, and there was a crew of twenty-four men. The court recognizes the skill displayed, but adds that the risk of life or property was only such as might be expected in such work. When the Haxby was delivered at dry dock she was badly damaged, and it was "clear from the evidence" that the injuries were received after the salvors commenced their work. At the time the vessel was delivered in dry dock her value did not exceed \$100,000. Taking into consideration the courageous manner in which the salvage work was done and having regard to all the risks run, the court decided that one-sixth of the value of the property saved would be fair to the salvors and just to the owners of the vessel. This amounted to \$16,666, and an order was made remanding the case back to the court below, with instructions to enter up the modified decree.

A dispatch from Marquette announces the death of William L. Wetmore, aged seventy-seven, one of the old landmarks of the Lake Superior country. Mr. Wetmore had been in active business in the Marquette region since 1856. In early days he was prominent in shipping and iron mining business, in which he made a fortune, only to be swept away in the panic of 1871. He was at one time a partner of Samuel J. Tilden in the New York mine, but the partnership finally broke up in litigation that lasted several years, and through which he acquired considerable note at the time.

A calendar issued by David Kahnweiler of 437 Pearl street, New York, contains several illustrations of life boats, life rafts, cork jackets, life buoys, etc., and is a constant reminder of the large line of life-saving appliances carried by that well-known New York house.

Assistant Naval Constructor R. B. Dashiell has gone to Europe to acquire information for the navy department respecting the methods of gun firing practiced on shipboard abroad, with a view to improving that branch of our naval service.

Army and navy charts of the lakes are kept in stock by the Marine Review, Perry-Payne building, Cleveland.

Around the Lakes.

Plans for a wooden tug are being prepared by the Jenks Ship Building Co. of Port Huron.

A new ore vein of great promise is said to have been found in the Iron Belt mine, Gogebic range.

The annual meeting of the Dry Dock Association of the Lakes will be held at Milwaukee on Tuesday, the 16th inst.

Capt. James Reed says that he will again renew in the spring the attempt to raise the steel steamer Cayuga, sunk near the Straits.

Tonnage of the steel barge Australia, building at South Chicago for James Corrigan of Cleveland, is 3,745.17 tons gross and 3,467.89 net.

The Milwaukee Dry Dock Co. has enough work on hand to keep both yards busy until the opening of navigation. Employment is now given to upward of 250 men.

Wednesday, Feb. 2, is the date fixed for the annual reception, ball and banquet of the marine engineers of Cleveland. For seventeen years the Cleveland organization has met with its friends in this way, and these gatherings have always been pleasant.

Detroit ship masters have arranged for a series of lectures on maritime subjects, to be delivered on Wednesdays, throughout the winter, at their lodge rooms, No. 12 Woodward avenue. The series will include a discussion of admiralty law, ship building, civil engineering, etc.

Capt. James Owen, who last season commanded the steamer G. W. Morley, which burned off Evanston, Ill., in December, is at Milwaukee looking after the repair work which may be found necessary on the steamer Iosco as the result of stranding on Gray's reef. Capt. Owen will command the Iosco next season, Capt. James L. Bradshaw retiring.

It is expected that a coal shipping plant, similar to that operated by M. A. Hanna & Co. at Ashtabula, which is being erected on the B. & O. docks at Sandusky, will have a capacity of 250 to 300 tons an hour. The plant will be ready for the transfer of coal to vessels about the opening of navigation next spring.

A remarkable showing in fuel economy has been made by the steamer Business since her engines were compounded by the Dry Dock Engine Works of Detroit. This steamer in 1896, before being overhauled, ran 27,000 miles with a fuel bill of \$4,700. After she had been refitted in 1897, she ran 24,250 miles, and her fuel bill was only \$2,450.

With a new machine shop, electric cranes over ship building slips and a large number of modern ship building tools, officials of the American Steel Barge Co. are of the opinion that their yard at West Superior can now be operated as cheaply as any ship yard on the lakes. They will undertake some lines of structural iron work at the ship building plant.

At the annual election of Buffalo lodge, Ship Masters' Association, Alexander Clark was chosen president, E. C. Mayham first vice-president, John Dugan second vice-president, John Perew secretary, Lyman Hunt treasurer, and John McCarthy trustee for three years. Capt. Clark was selected as delegate to the grand lodge with Ed. Thorp alternate.

Capt. Ralph J. Lyons is looking after the construction of another steel steamer for Mr. A. B. Wolvin of Duluth. He will be at the Cleveland Ship Building Co.'s works, Lorain, until the Zenith company's new steamer is completed, and will then take command of her. Capt. Frank Ray of Vermillion will succeed Capt. Lyons in the steamer Empire City.

At the annual meeting of the Ashtabula Tug Co., which was held Tuesday, C. E. Grover, D. R. Hanna, H. G. Dalton, M. A. Bradley and W. A. Collier, all of Cleveland, were re-elected directors. The directors will meet in a few days and will very probably re-elect C. E. Grover president; D. R. Hanna, vice-president, and W. A. Collier, secretary and treasurer.

Through its lake connections at Manitowoc the Wisconsin Central Ry. Co. secured a big increase of business in 1897. Westbound package freight amounted to 12,340 tons, and the coal freight to 39,886 tons. Eastbound shipments were 37,126 tons of grain and 73,206 tons of package freight, principally flour, making a total of 110,329 tons. Eastbound and westbound freight together footed up 162,555 tons.

The Waldo-Choctaw collision case has been taken up in the United States district court at Cleveland. The collision occurred in the Sault river, May 20, 1896. The Choctaw was sunk, damages amounting to about \$25,000 in her case and \$15,000 in the case of the Waldo. The Waldo is represented by John C. Shaw and W. B. Cady of Detroit, Wm. Webster of Sault Ste. Marie and George Clinton of Buffalo. Harvey D. Goulder represents the Choctaw.

Riveters at Wheeler & Co.'s ship yard, West Bay City, quit work Tuesday. A protracted strike would work to the disadvantage of both the men and the company, as there is a large amount of work on hand and a contract for another steel steamer is expected. Officials of the company say they will give consideration to any differences of opinion that may exist regarding wages, but they will resist to the utmost any effort to make the yard what is called a union yard.

An effort will be made to secure an appropriation from the present congress for a fog signal at South Chicago. The increase of business at South Chicago within the past few days has been greater than at any other port on the lakes. Smoke as well as fog is a great hindrance to navigation in the vicinity of Chicago and there is urgent need of this fog signal. Light-house officials will favor it, but it will be hard work to secure appropriations of any kind in Washington this winter.

Vessel owners in all parts of the lakes are among the principal patrons of the Long Distance Telephone Co. The Cleveland Telephone Co. has just taken up quarters in a new building and has equipped a new exchange at an enormous expense, the switchboard and other appliances representing the latest practice in this line. The long distance office is now located in this new building in connection with the local headquarters, and a still further improvement in the service is promised on account of this change.

Alex. Anderson of Marine City has been awarded a contract to build a wooden steamer for Messrs. A. F. Price of Fremont, O.; Isaac Lincoln of Dakota and Capt. Peter Ekhart of Port Huron. The dimensions of the boat are to be as follows: Length of keel, 130 feet; beam, 30 feet; depth, 9 feet; capacity, 400,000 feet of lumber or 600 tons. The boiler will

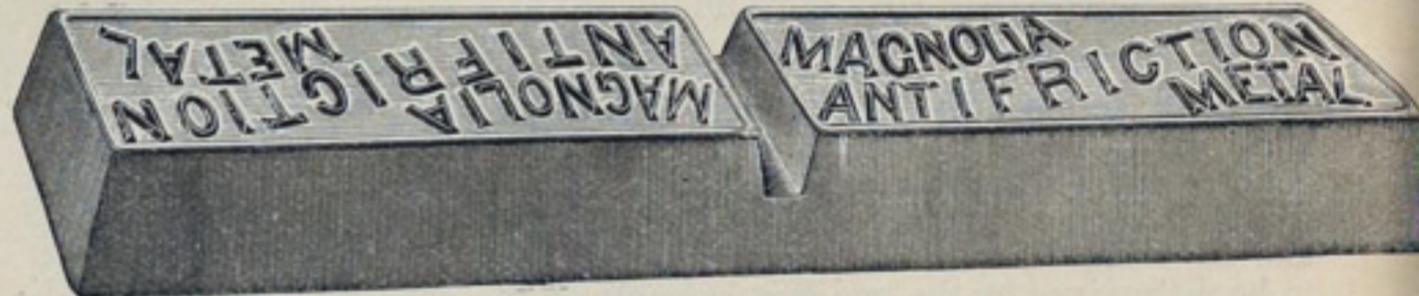
be 8 feet 6 inches in diameter and 13 feet long. The engine will be a fore and aft compound, 16 and 32 by 26 inches. The steamer will have a steel arch 18 inches wide and $\frac{5}{8}$ of an inch thick, and a steel strap on keelson 29 inches wide and $\frac{3}{4}$ of an inch thick. She will also be equipped with steam capstan, steering gear, windlass and deck hoist. The contract price is \$28,000. The boat is to be named Isaac Lincoln.

Officials of the Chicago & Northwestern Ry. Co. announce that a new ore shipping dock will be built on the site of the No. 4 dock, burned recently. Dock No. 2, which has not been used for two or three years, will be torn down and part of the material put into the new structure. The new dock will be 60 feet high, which is 12 feet higher than the one destroyed. It will have 250 pockets, each with a capacity of 125 tons of ore. In length and width it will be the same as the old dock. The estimated cost is \$250,000.

A report from Custodian Wagstaff of the Sand Beach harbor of refuge shows that in 1897 there was a falling off in both the number of vessels seeking shelter and the registered tonnage from last year, which also fell behind the year before. There are two reasons for this: One, that many of the old-timers which formerly sought shelter have passed out from various causes; the other, that the last two seasons have not been as stormy as those that went immediately before. The number of vessels that sought shelter at Sand Beach in 1897 was 1,205 of 479,428 tons.

An Injunction Case.

The Magnolia Metal Co. has had numerous suits during the past two or three years with parties infringing their trade marks and patents. An injunction was granted on Dec. 15 last by Lord Chief Justice Russell in the queen's bench division of the high court of justice, London, England, enjoining the Tandem Smelting Syndicate, Ltd., and restraining them from passing off their metal for Magnolia metal. A few months ago the Globe Engineering Co., Ltd., of Manchester, (now in liquidation) shipped a quantity of metal to a firm in South Africa that had ordered Magnolia metal. The metal sent to fill this order was made up into ingots as near as possible to represent the ingots of Magnolia anti-friction metal. They bore the words "Magnolia anti-friction metal," but the trade mark, the



magnolia flower, and the words "patented June 3, 1890" were not imprinted upon them. The purchaser brought an action in the high court of justice at the Manchester assizes, against the sellers, and judgment was given in his favor by the arbitrator to whom the matter was referred.

The magnolia company accordingly directs attention to the accompanying fac-simile of the kind of bar in which the genuine article is made up. The name and trade mark (magnolia flower, which appears in the advertisement of the company on the cover of the Review) are always stamped on bars and boxes; and besides this the words "patented June 3, 1890," and "manufactured in the U. S." are stamped on the under side of each bar. The magnolia flower trade mark is registered in every civilized country in the world.

Every ship yard on the lakes has now taken up the use of pneumatic tools for riveting, reaming, chipping and caulking, etc., and the progress that will be made with these tools within the next year or two will have a wonderful effect on the cost of building a steel ship. The Chicago Pneumatic Tool Co., which manufactures these tools, has received cable orders from Europe since the first of January for thirty No. 2 hammers, thirty No. 3 piston air drills and five pneumatic riveters. The tools are going into ship yards, foundries, boiler works and railway shops all over the world. The development of the Chicago company's business is wonderful. The stockholders held a meeting in Chicago on the 11th inst. and elected J. W. Duntley president, J. F. Duntley vice-president, and LeRoy Beardsley secretary and treasurer. A report submitted to the stockholders showed a doubling of business in 1897, with the greatest number of orders for a single month booked in the last month of the year; and now January business is certain to be larger than that of any month in the history of the company. This is certainly one concern that is making a record in selling tools in foreign markets.

WANTED.—To charter four or five package freight boats; one to three years; boats adapted for both ore and package freight preferred. In making application state as to gangways and hoisting machinery in detail; also estimated capacity in full load, barrels of flour or mill stuffs, grain and ore; what kind of machinery and boilers and coal consumption of twenty-four hours' steaming; also speed per hour, and where boat laying at present. Address Marine Review, Cleveland, O.

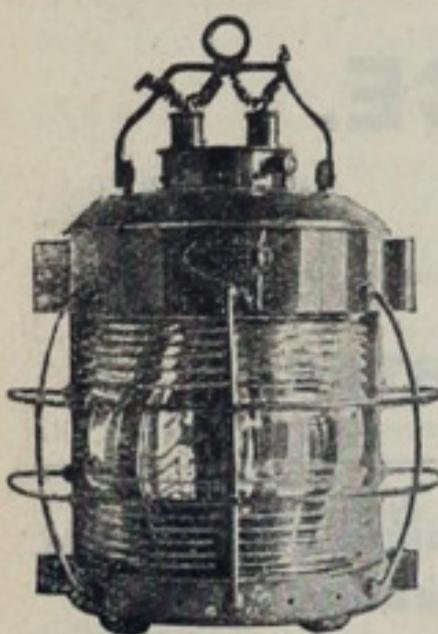
A one-sixteenth interest in the Steamer Louisiana, belonging to the estate of Walter B. Scott, deceased, will be sold at auction on Monday the 24th day of January, 1898, at court house, northwest cor. Public Square, Cleveland. She is a wooden Steamer built at Marine City, Mich., in 1887; 267 feet long, 1,250 net tons, and rates A 1* in the Inland Lloyds.

H. W. KITCHIN, Admr.

U. S. ENGINEER OFFICE, DULUTH, MINN. Nov. 30, 1897. Sealed proposals for building substructure for south pier, Duluth Ship Canal, will be received here until noon, Jan'y 15, 1898, and then publicly opened. Information furnished on application. Clinton B. Sears, Major. Engrs.

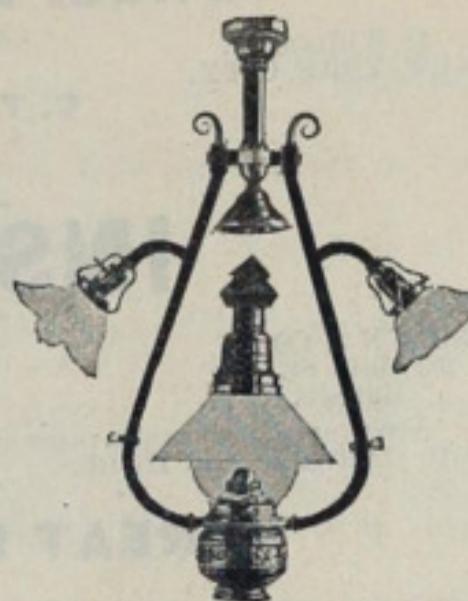
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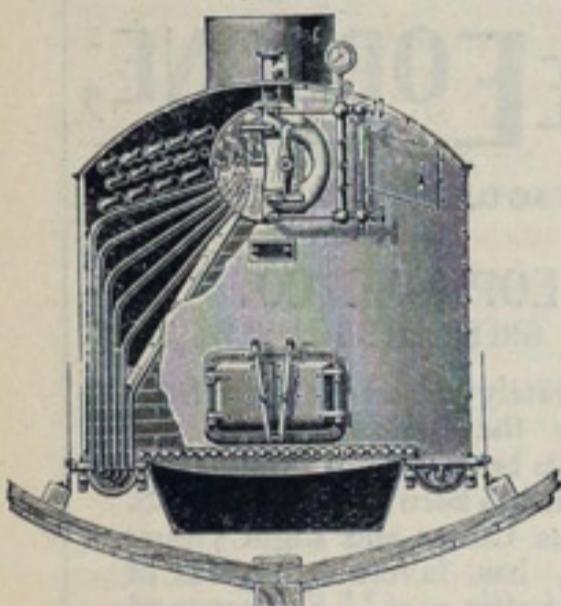
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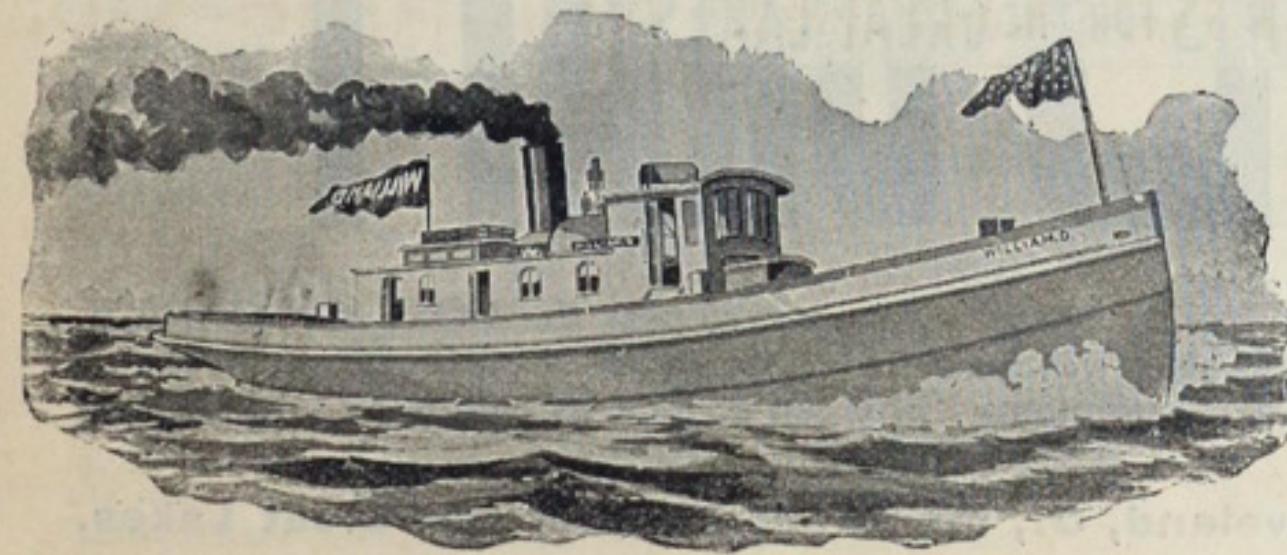
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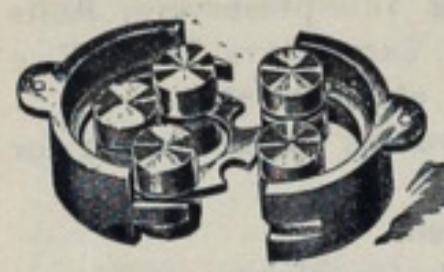
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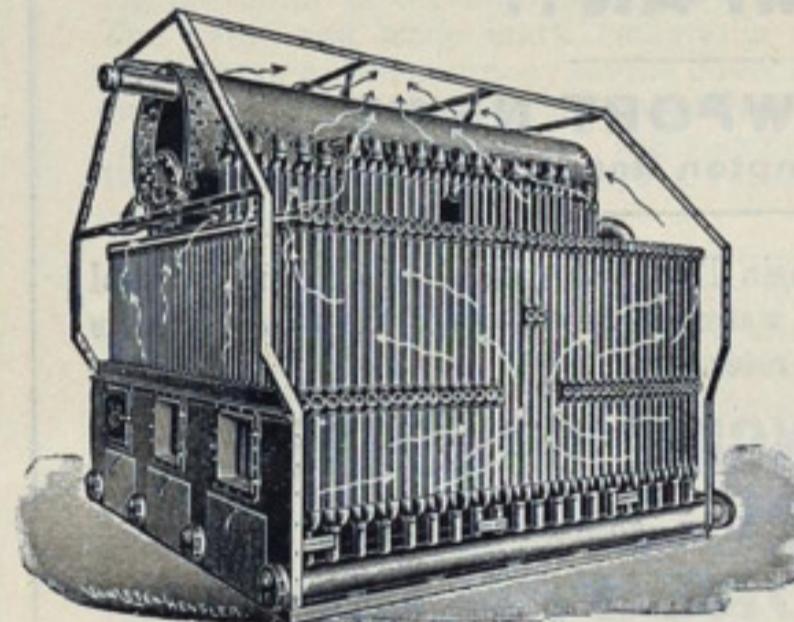
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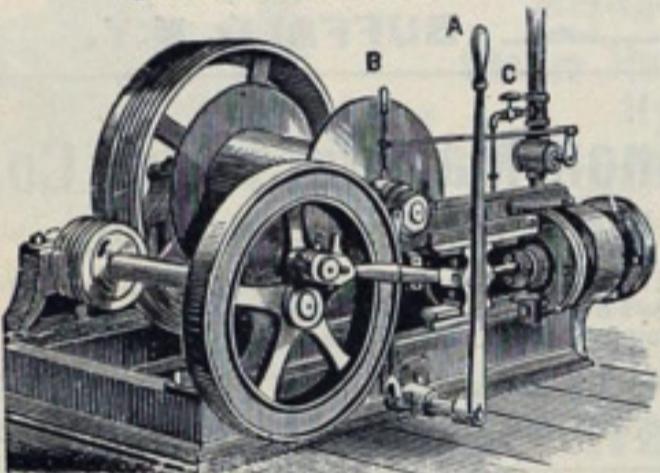
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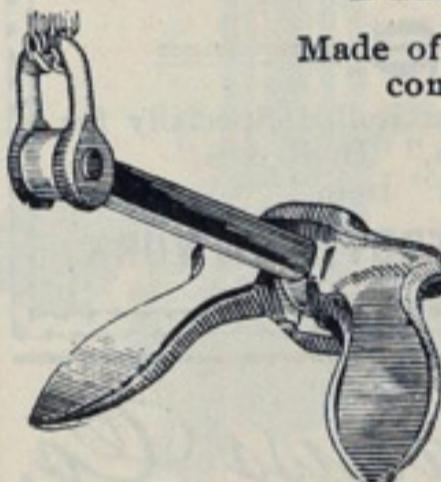
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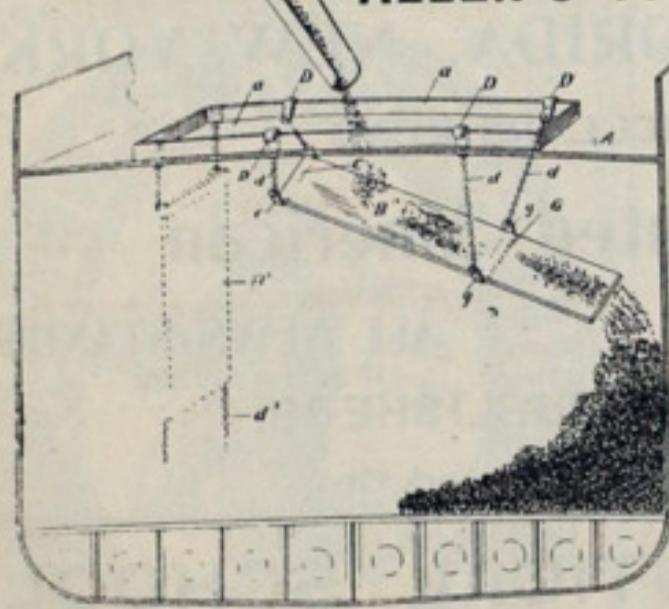
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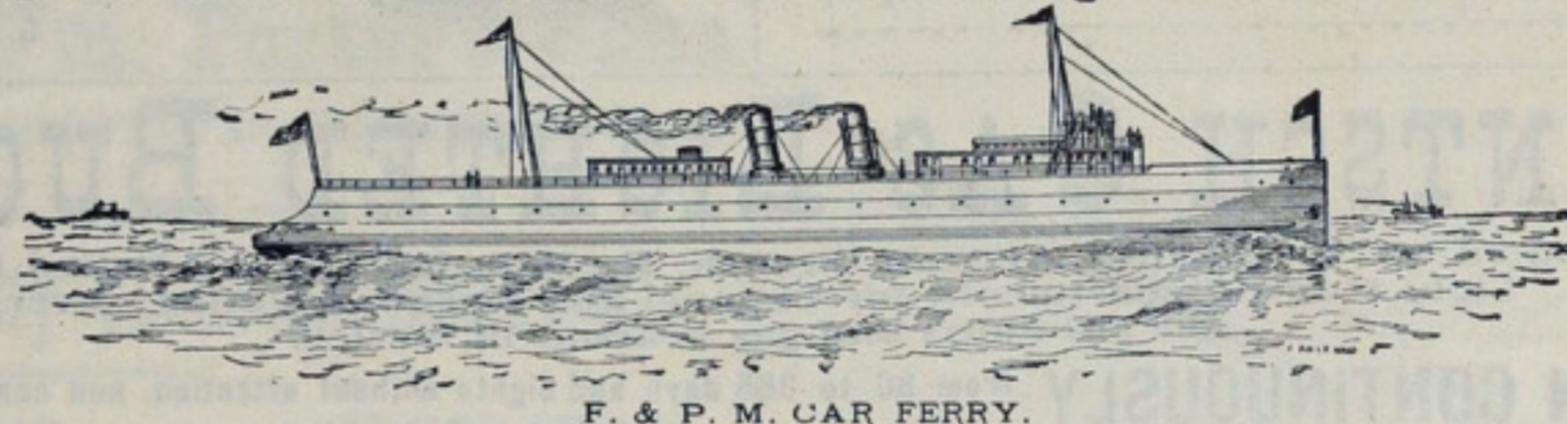
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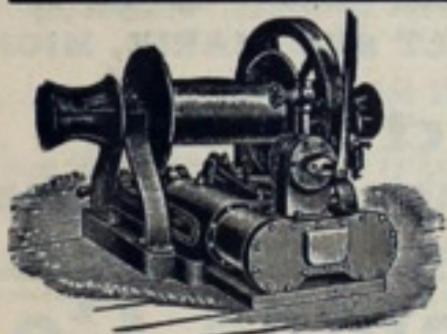
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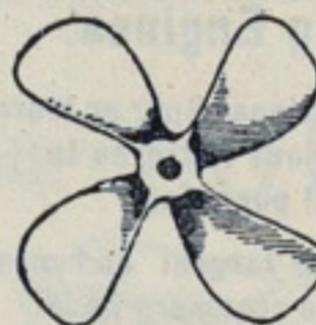
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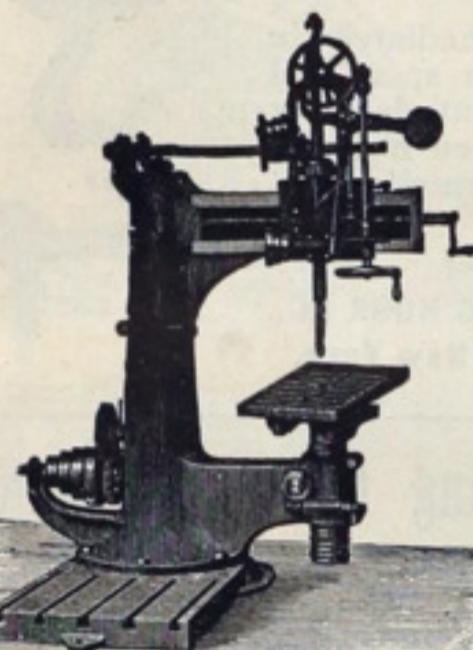
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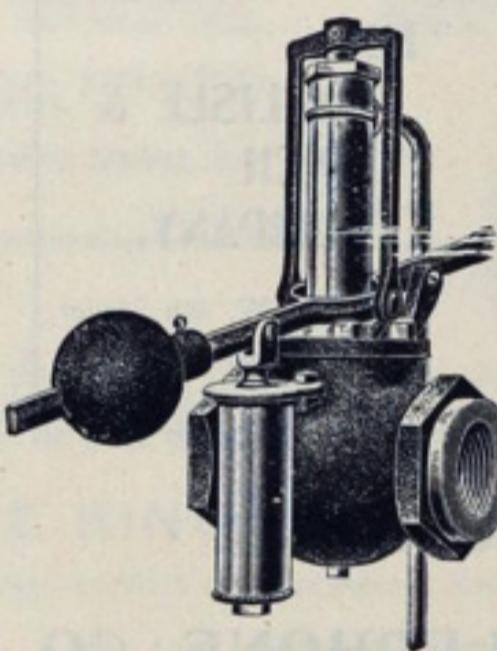
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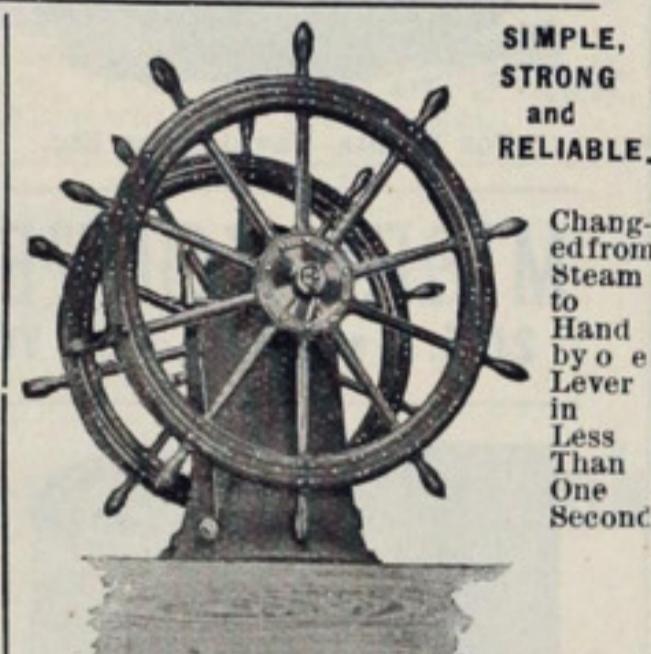
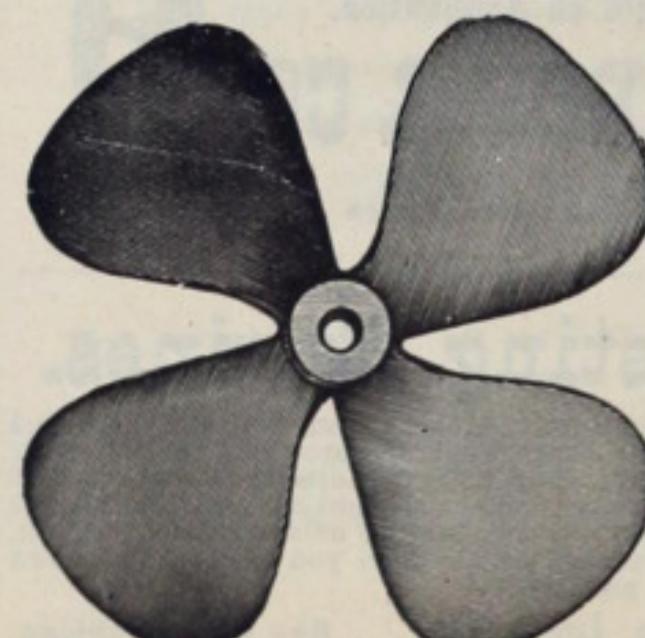
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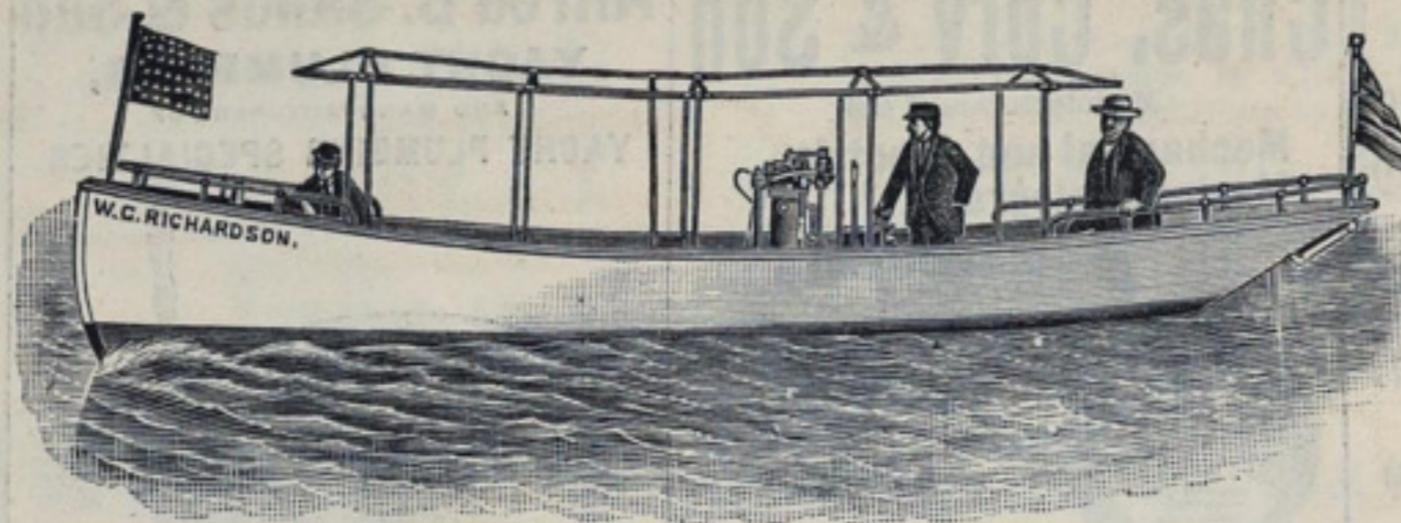


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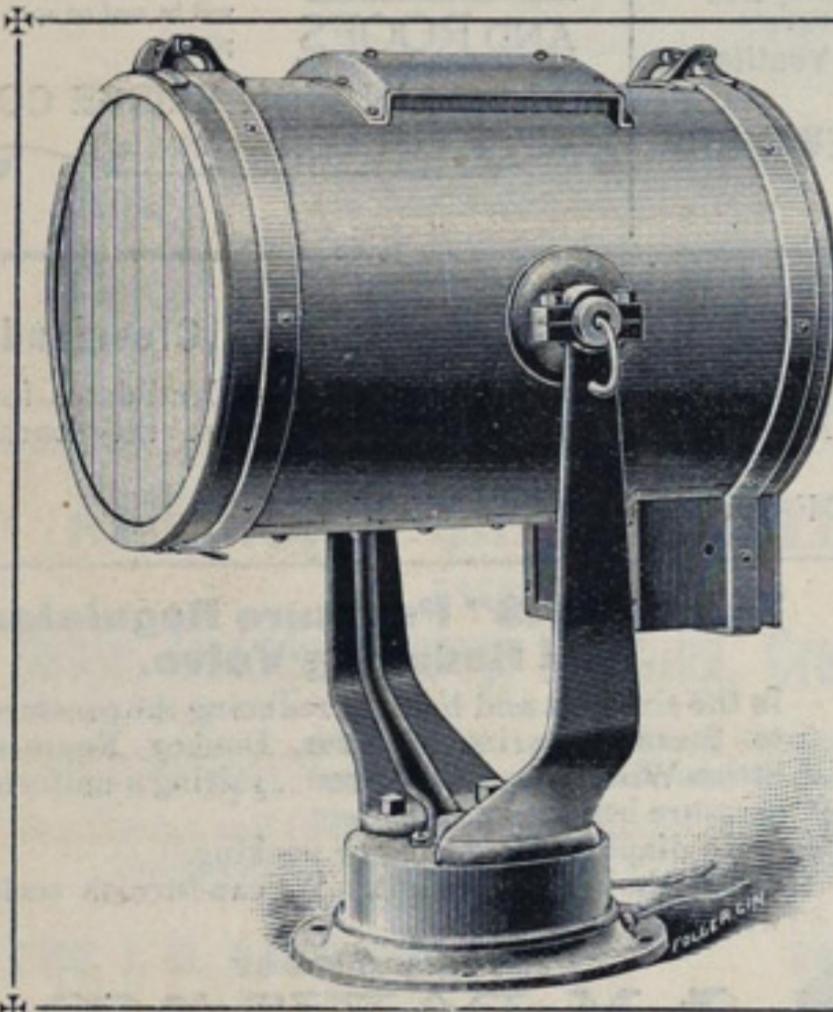
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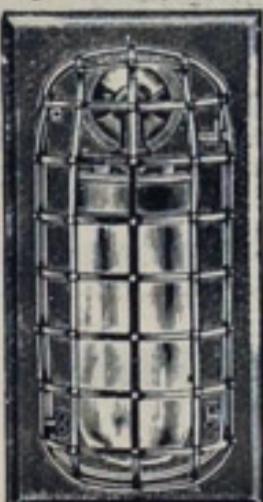
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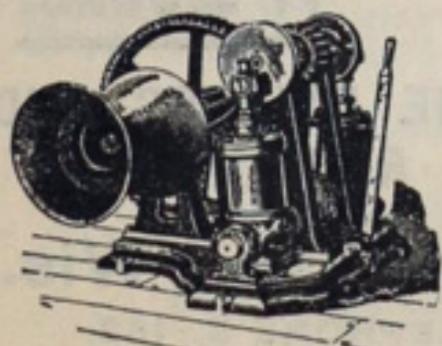
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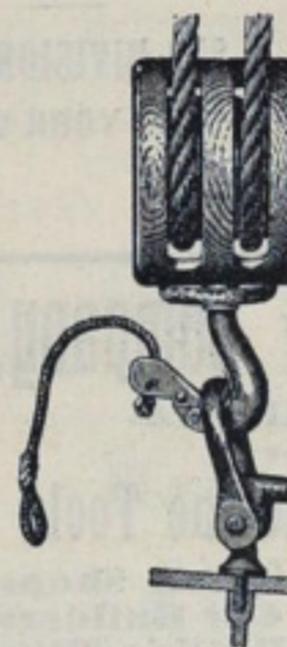
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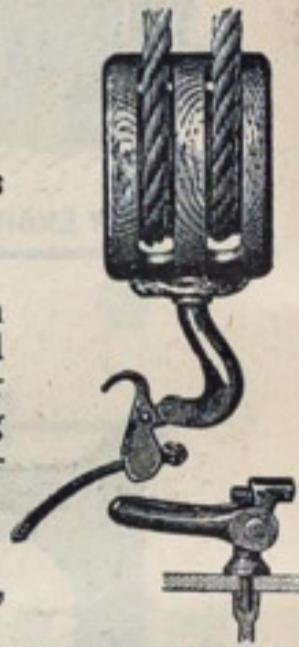
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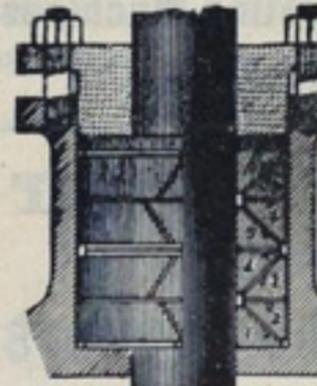


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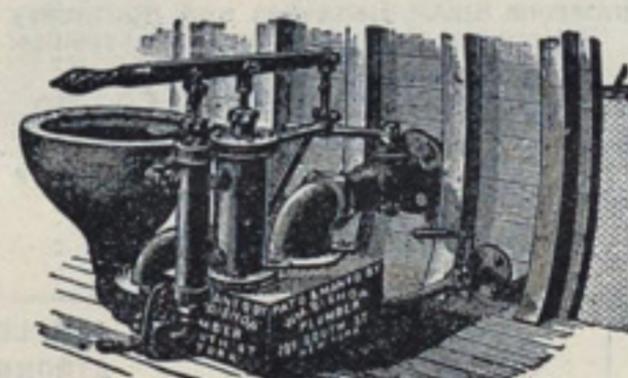
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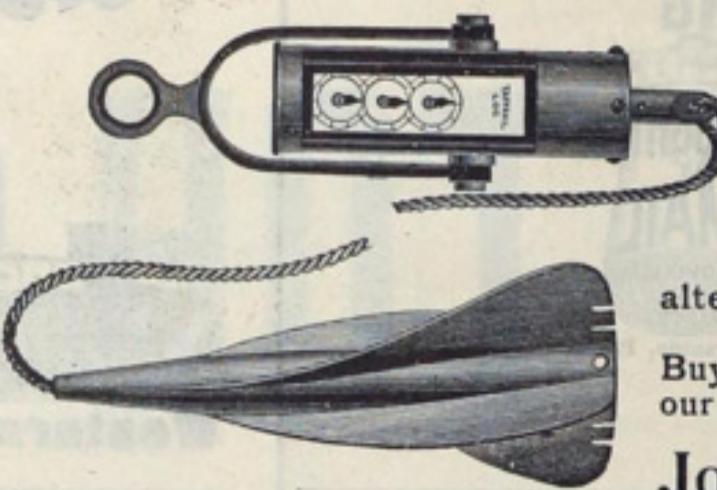
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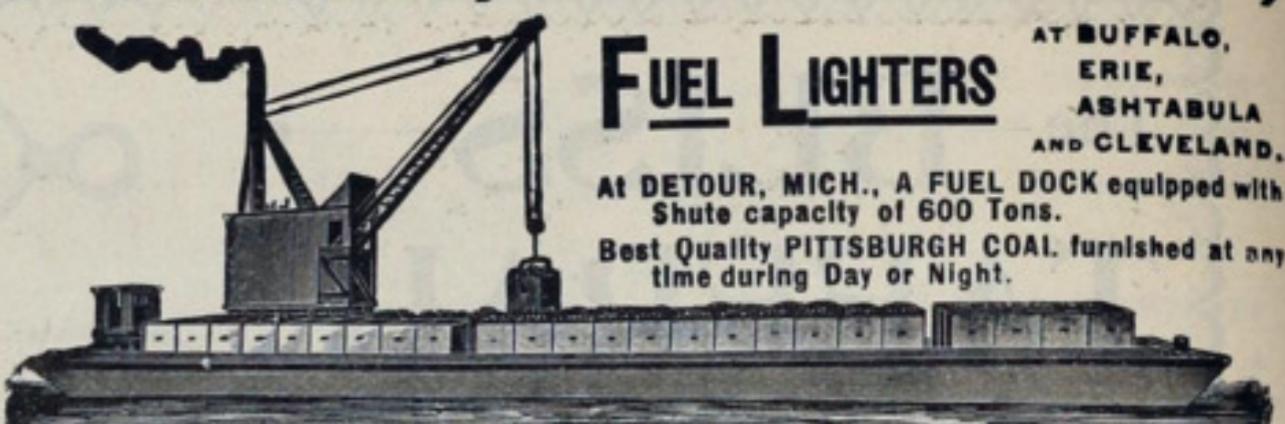
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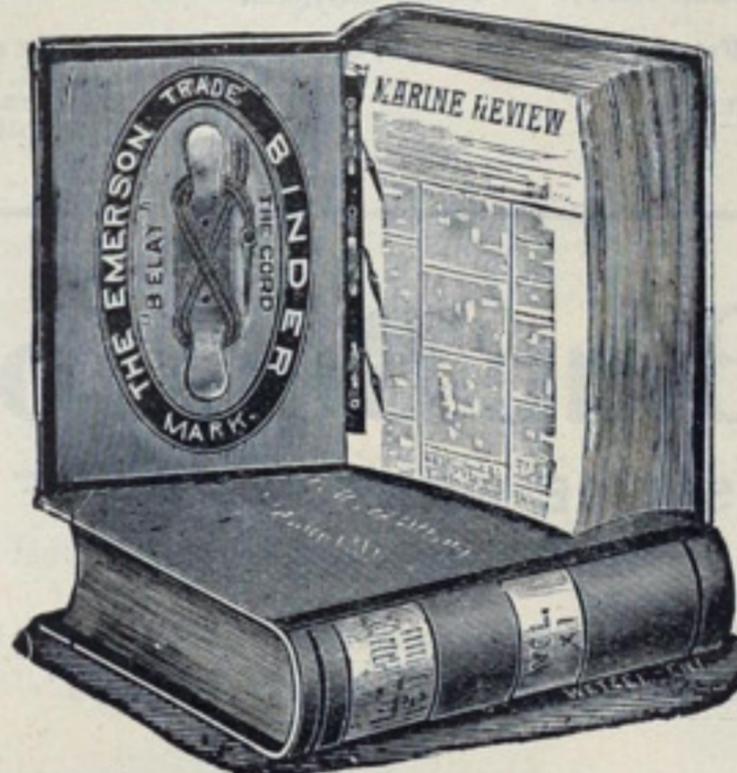
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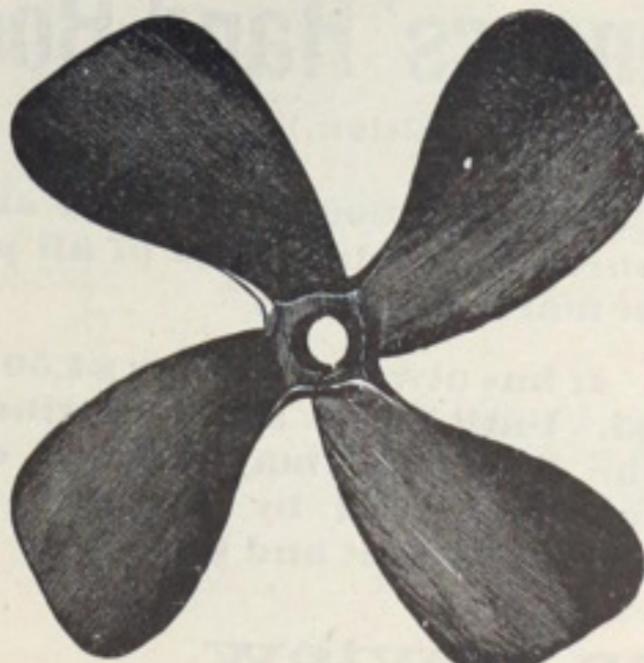
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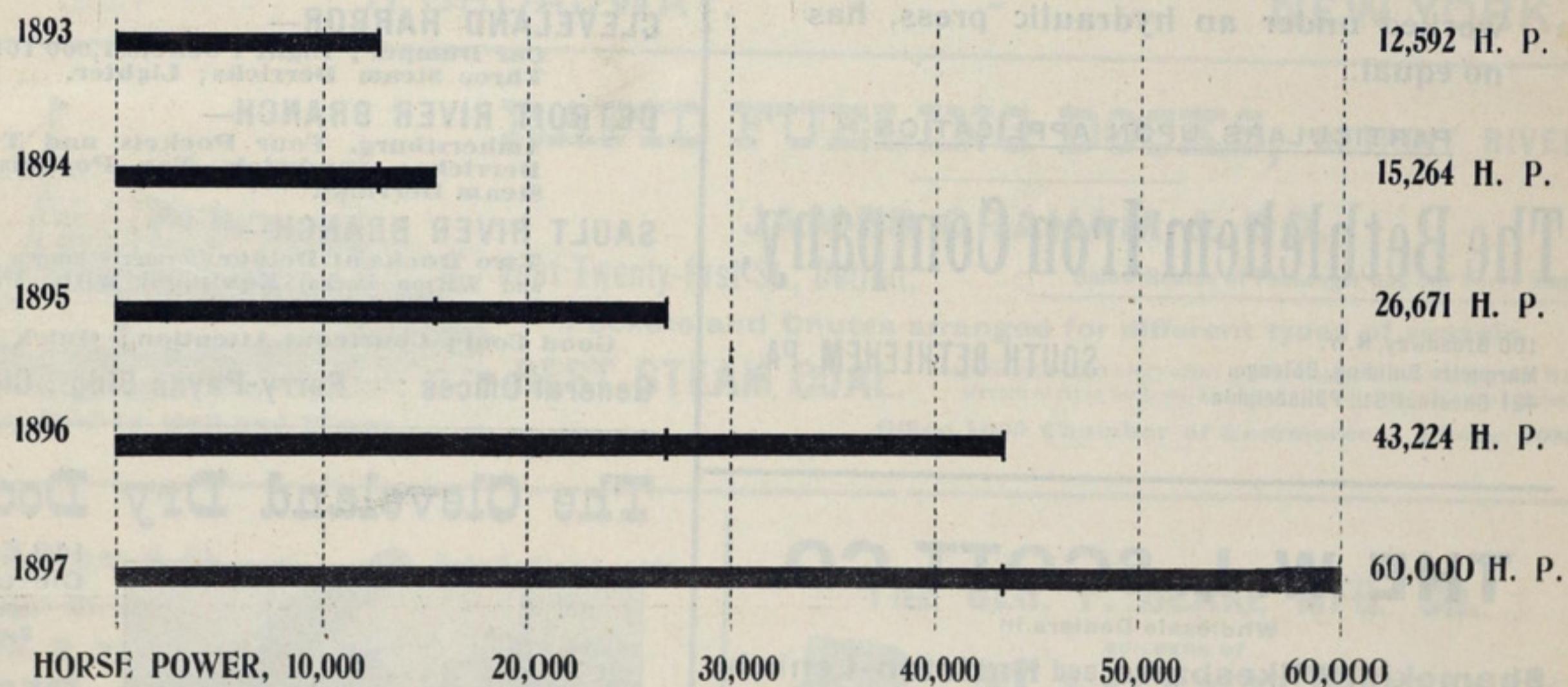
623 STEAMERS=1,600,000 HORSE POWER.

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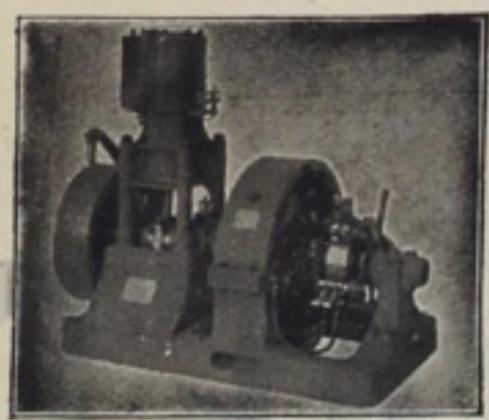
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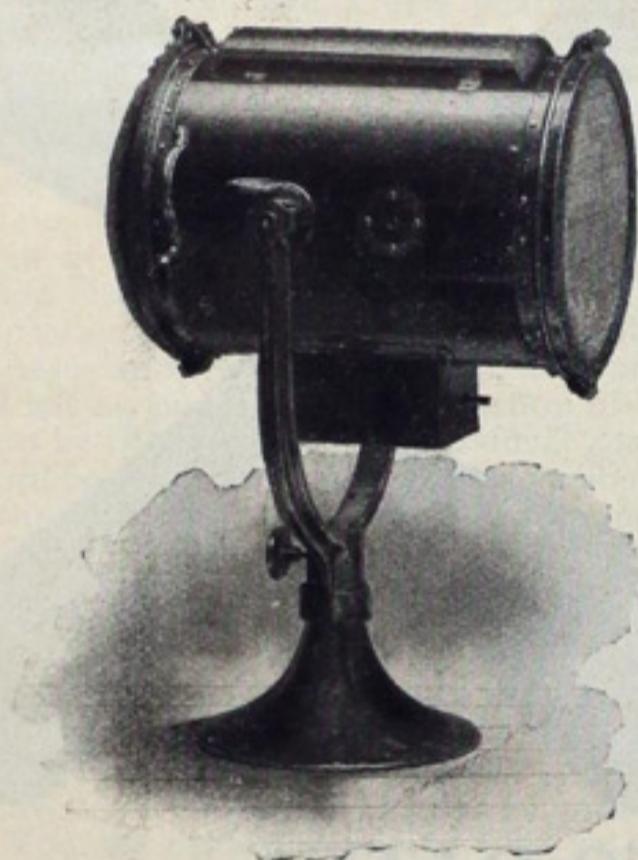
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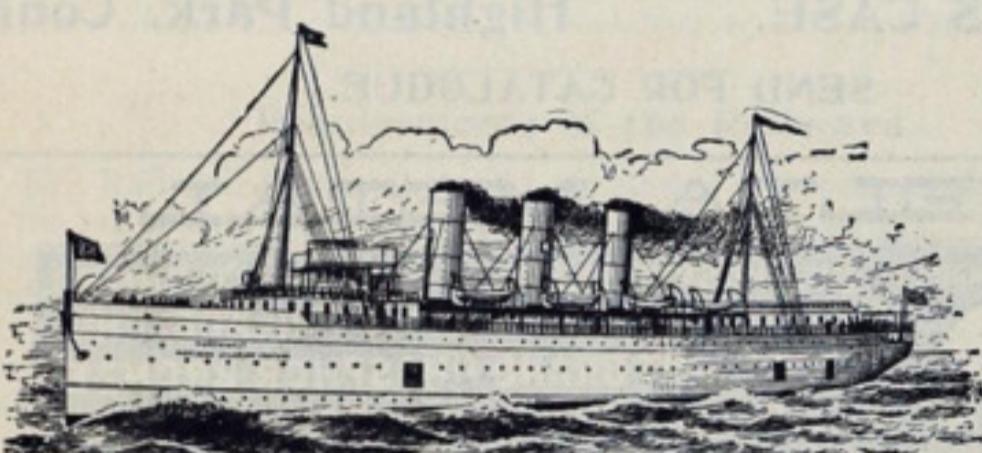
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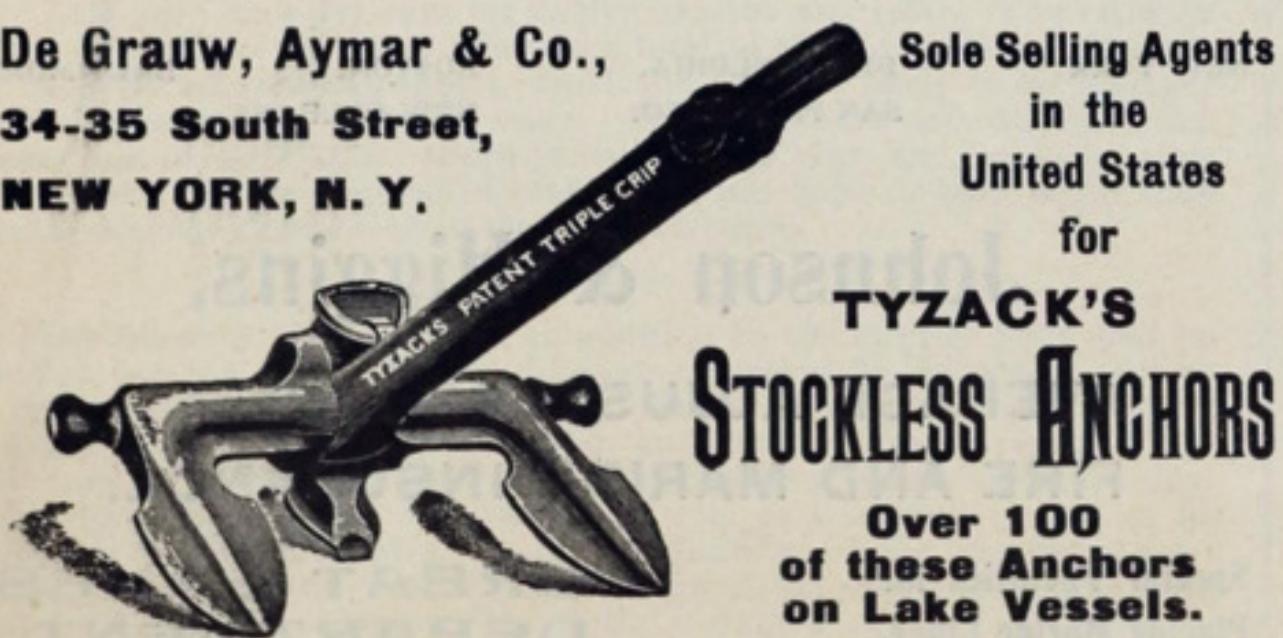
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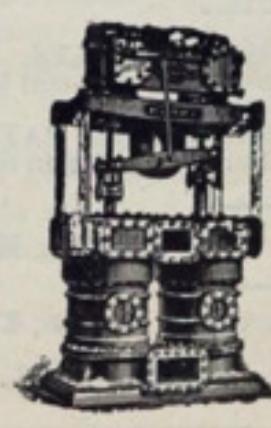
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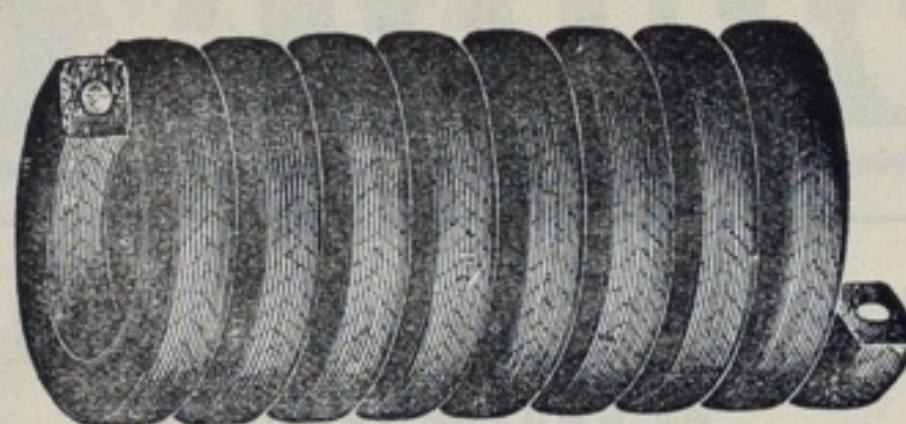
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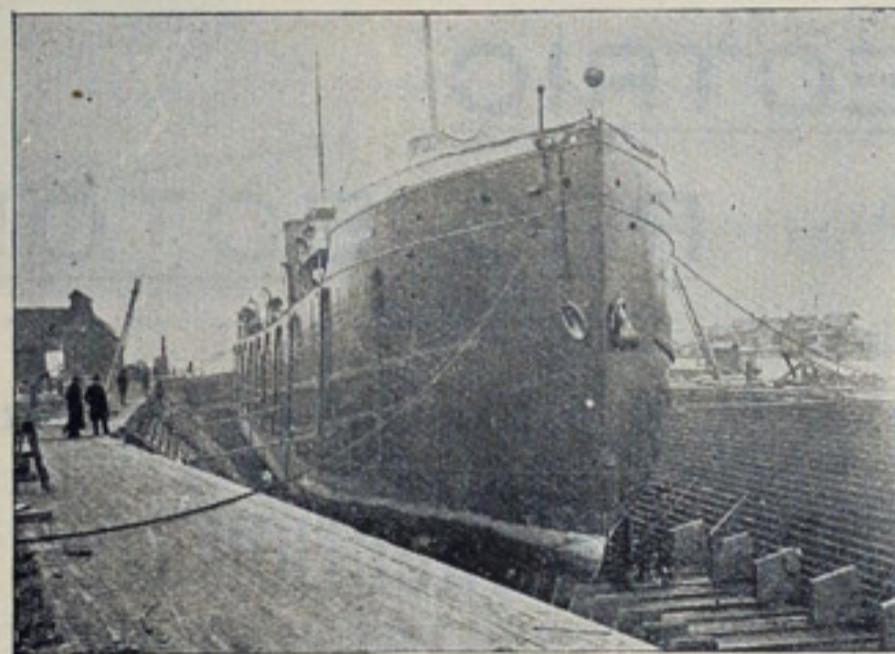
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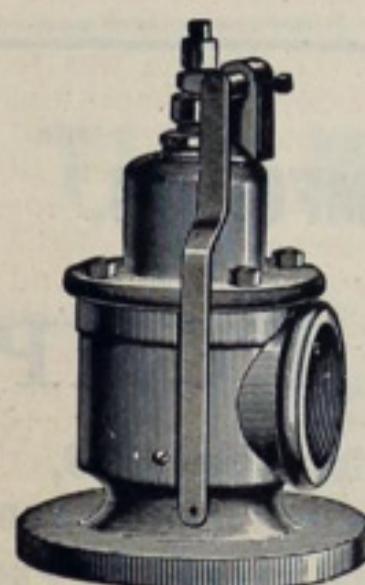
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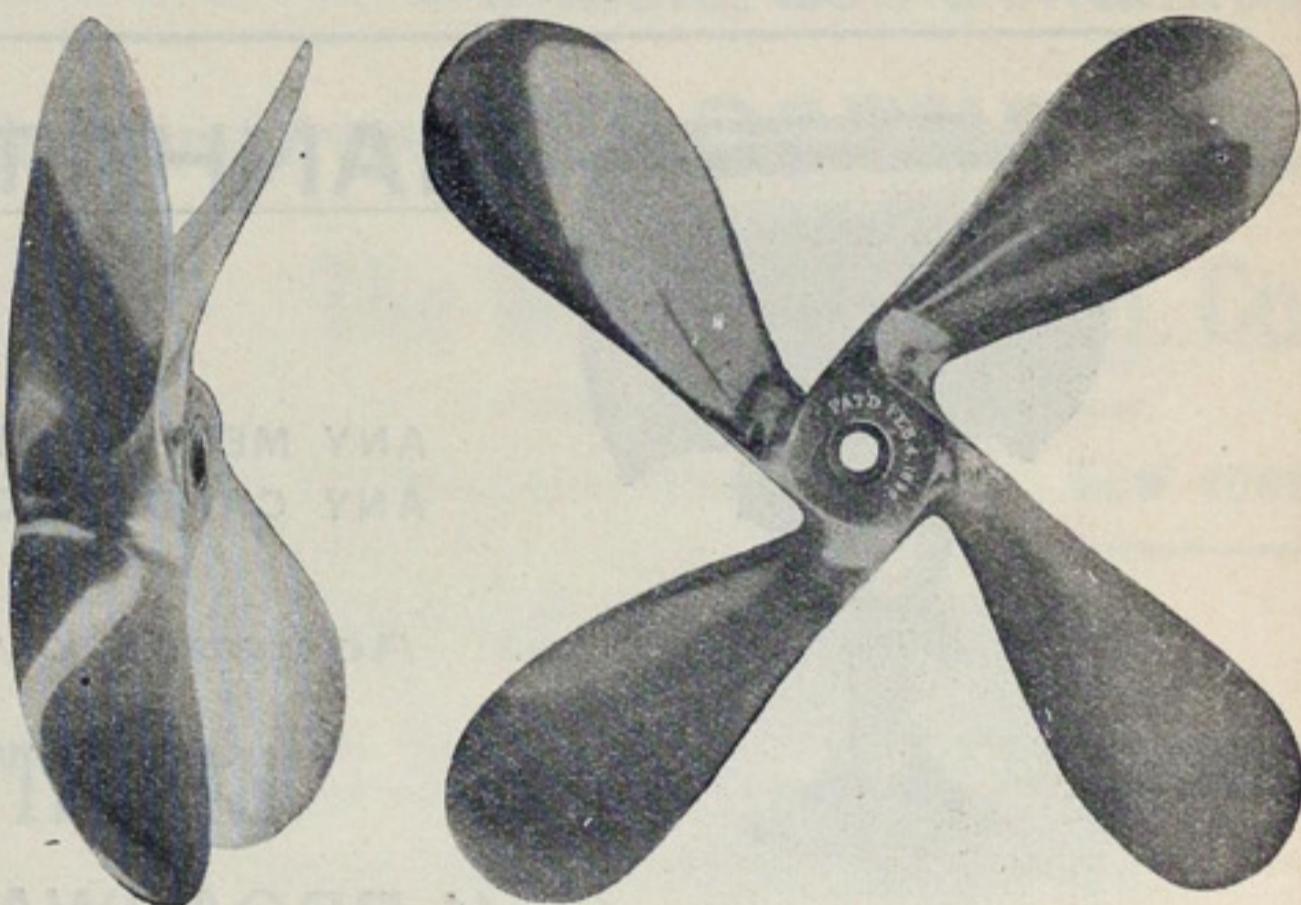
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